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THE RED INVASION OF MONGOLIA

AND YET AGAIN, THE AUTUMN
MANOEUVRES

JAPAN'S STAND AT THE TARIFF
CONFERENCE

THE LAUNCHING OF THE "TAISHAN"

ELECTRIC POWER DEVELOPMENT IN
NAGOYA, JAPAN

THE DIESEL ENGINE IN FAR EASTERN
VESSELS

ASBESTOS IN THE PHILIPPINES

THE DAIREN BEAN OIL INDUSTRY

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SHANGHAI, PEKING, TOKYO AND MANILA

22 10

JAPAN

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TOYO KISEN KAISHA
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My dear Rea:

I have just spent a very pleasant hour going over the Reconstruction Number of the Far Eastern Review and I want to compliment you on that tremendous production. It is truly a monumental edition that deserves great praise being the most comprehensive thing of its kind that has to my mind ever been attempted. It is too bad, from a financial point of view, that you cannot turn out a number like this every issue.

With kind personal regards and best wishes,

Sincerely,

James King Steele
JAMES KING STEELE.

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The Far Eastern Review

ENGINEERING

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VOL. XXI

SHANGHAI, OCTOBER, 1925

No. 10

The Red Invasion of Mongolia

Soviet Russia has Created Mongolia into an Autonomous Buffer State Republic—A Huge Territory has been Stolen from China by the Most Hypocritical Imperialistic Power of Modern Times

The Sore Spot of Asiatic Politics

THE imperialistic policy of Soviet Russia has two direct aims : 1. the creation of buffer republics friendly to Soviet Russia on the Russian frontiers, 2. the creation of disturbances beyond the buffer states with a view toward making an attack on Soviet Russia difficult if not impossible. Soviet Russia had adopted the whole of the imperialistic program of Imperial Russia, which means that in Europe the Soviet seeks the humiliation of Poland and in Asia, the humiliation of China and Persia. The two chief objectives of Russian venom are Great Britain and Japan—Great Britain because of her position in India ; Japan because of the successful outcome of the Russo-Japanese War and because of Japan's predominant position in Asiatic affairs. Although individual Russians know no race prejudice perhaps because Russia is such a conglomerate of Asiatic races, Russia views with distrust, jealousy and hatred, the rise to power of an Asiatic people, the Japanese. The anti-British policy of Imperial Russia kept Central Asia in a turmoil for almost a century. The anti-Japanese policy of Soviet Russia is to-day helping to keep China in chaos and turmoil. In discussing the Russian invasion of Mongolia, it is necessary to keep in mind the permanent, fixed international policy of Soviet Russia.

The Invasion

Before China signed a treaty of peace with Soviet Russia, the Russians had already invaded Mongolia and had taken Urga. The excuse was that the "White" Russians were using Mongolia as a base for counter-revolutionary movements. The Chinese government had established a Frontier Defence Force, but the funds for this purpose were dissipated and nothing beneficial to China came of it. The Soviet's excuse for the invasion of Mongolia is only remotely justifiable, but not more so than the Imperial Russia's invasion of Aberzajain province in Persia. It was simply part of an imperialist scheme to sieze territory belonging to another nation.

Russia had for more than a century played upon the Mongol's antagonism to China. Russian agents, even in the days of the Czar sought to develop a Russian orientation among the Mongols. Mongol Princes were sent to schools in St. Petersburg and Moscow, even to the exclusive Page School attached to the court. Russia hoped to build feeders into Mongolia for the Trans-Siberian Railroad. Mongolia was a step to Thibet and therefore to India. Mongolia was a step to China and therefore to Japan.

When China signed a preliminary agreement with Soviet Russia, this Mongolian question loomed large. China wanted the Soviet troops withdrawn. In a statement of China's wishes with regard to the new treaty, the Waichiaopu stated :

(2) The withdrawal of Soviet troops from Outer Mongolia should be made a more definite undertaking on the part of the U.S.S.R. It should not be made conditional, though necessary details to carry out the withdrawal may be arranged

later at the Conference. In other words, the wording of the said provision should be so modified as to make it clear that there is no intention to perjure the principle of inviolability of territorial sovereignty.

The Treaty

In the treaty signed by Mr. Karakhan and Dr. Wellington Koo, the following agreement was reached ;

"The Government Union of Soviet Socialist Republics recognizes that Outer Mongolia is an integral part of the Republic of China and respects Chinese sovereignty therein.

"The Government of the Union of Soviet Socialist Republic declares that as soon as the 'questions' for the withdrawal of all the troops of the U.S.S.R. from Mongolia, namely as to the time limit of the withdrawal of such troops and the measure to be adopted in the interests of the safety of the frontiers are agreed upon at the Conference as provided in Article II, of present Agreement, it will effect the complete withdrawal of all the troops of the U.S.S.R. from Outer Mongolia.

The conference alluded to has never taken place, largely through the trickery of Soviet Russia which has steadily refused to meet with the Chinese commission for that purpose. Just before Mr. Karakhan left for Russia, for his health as he put it, Dr. C. T. Wang, practically forced him to open negotiations but they have thus far come to nothing.

The Withdrawal of Troops

Comrade Karakhan sent an unctious note some time previously announcing the withdrawal of the Soviet Army. The note said :

"With the establishment of order and peace and the organisation of proper power in Mongolia, the Soviet Government gradually reduced the number of Red troops in Mongolian territory. However, the want of relations between the Government of the Union of Soviet Socialist Republics and the Republic of China as well as the latter's participation in the anti-Soviet coalition, prevented the settlement of the question of the presence of the Red Army in Outer Mongolia, and it was only by the agreement signed between the Union and China on May 31, 1924, that the solution of this question was outlined. By virtue of this agreement, it was understood that, as soon as the questions for the withdrawal of the troops of the Union of Soviet Socialist Republics from Outer Mongolia—namely, as to the time limit of the withdrawal of such troops and the measures to be adopted in the interests of the safety of the frontiers were agreed upon at the Conference, that after that the Government of the Union would effect the withdrawal of its troops from Outer Mongolia.

"However, though the said Conference was to be opened within one month from the signing of the mentioned agreement, internal circumstances prevented the Chinese Government from doing it in due time. Nevertheless, the Government of the Union—although by virtue of the above-mentioned agreement with the Republic of China, it could refrain from effecting the withdrawal of its troops until the time limit for such withdrawal were agreed upon at the Conference and until the Government of the Republic of China give the necessary guarantees for the safety of the frontiers—has decided to effect the withdrawal of its troops immediately, without waiting for the Conference.

"I have now the honor to bring to the cognizance of the Government of the Republic of China that the Government of the Union of Soviet Socialist Republics has proceeded, with the consent of the Mongolian Authorities, to the withdrawal of its troops from Outer Mongolia and that at the present time the withdrawal of the Red Army from the Mongolian territory has been completed.

"Bringing this to your Excellency's knowledge, I may express the hope that the Government of the Republic of China will duly appreciate this friendly measure of the Government of the Union. My Government also hopes that those circumstances which made it necessary at the time to bring the Red Army into the territory of Outer Mongolia, now—when conditions have changed—will no longer occur in the future.

"At the same time, I may be permitted to express my earnest conviction that the Chinese Government will not let such a happy opportunity pass by of solutioning—by a peaceful understanding with the Mongolian people—the question of mutual relations between two brotherly peoples.

"While the Government of the Union of Soviet Socialist Republics considers that the said mutual relations are a matter entirely of the Chinese and the Mongolian peoples, it will, however, be happy to see that the brotherly ties of common life of the Chinese and the Mongolian peoples are established on the basis of justice and their national aspirations—which will ensure the further economic prosperity both of Outer Mongolia and the North-Western region and will likewise promote the development of relations economic and otherwise with the Union of Soviet Socialist Republics.

"I wish to take this opportunity, etc.

(Signed) L. Karakhan."

A Sovietized Mongolia

The Russians then had already withdrawn their troops from Mongolia. That was easy, because they had drilled and trained a Red Mongol army; they had officered that army, they had armed that army with Russian arms and munitions. They had established an autonomous Mongolian Government which no longer recognized the authority of Peking. They had financed that Government and had established a Government bank under the management of Russians. They had developed an economic and political suzerainty over Mongolia which amounts almost to the organization of a protectorate. In the recent internal trouble in China, Soviet Russia has sought to assist the Chinese generals in Mongolia and Turkestan against the Central Government as part of this effort to weaken China's hold on her north-western territories. Soviet Russia has done everything possible to wean Mongolia away from China and the Chinese people have been silent and asleep. Mongolia is so far away and there are so many problems facing China, that this was unnoticed, overlooked while Comrade Karakhan sat in Peking denouncing others as imperialists.

A Bolshevik Constitution

The Mongolian constitution perhaps more clearly than any argument, indicates the effect of Soviet influence on Mongolia. Imagine, the Mongols, who have not a modern industry in their whole country, so solicitous of the working classes and so hateful of capitalism! In a country still in pastoral condition, without roads or railroads, with barely a large city, where there is neither capital nor labor, but a nomadic population on the steppes of 2 per square mile and Sino-Russian-Mongol-Buriat *intelligentzia* in the few cities, what can this constitution mean but a blatant piece of Soviet propaganda, a noisome outcry against China?

The constitution as published by Soviet Russia reads as follows:

1. Mongolia is proclaimed to be a republic of independent people, the entire administrative power of the country belonging to the working people of Mongolia.

2. The fundamental object of the Mongolian Republic is to uproot the feudal divine right system and solidify the foundation of the Republican Government.

3. The land, underground wealth, forests, lakes, rivers and all resources thereanent belong to the Republic, and their private ownerships is forbidden.

4. All the international covenants, obligatory agreements, and foreign loans concluded prior to the revolution of 1921 are considered to be null and void, as they were forced upon Mongolia by foreign countries concerned.

5. For the purpose of securely maintaining the absolute governing power in the hands of the working people, a national Mongolian revolutionary army is organized, and whilst the working people of the Republic are armed, general military training shall be given to young working men.

6. Religion and temples are separated from the State, the former being declared to the entire people of the Republic to be a private affair of each citizen concerned.

7. For the purpose of assuring the freedom of speech of the working people, the Republic of Mongolian People shall organize a publishing establishment to be offered to the working people.

8. For the purpose of assuring true freedom of the working people, they are allowed to hold public meetings and gatherings, the Republic offering them suitable buildings for their meeting places.

9. For the purpose of assuring the working people the freedom of forming associations, the Republic shall give every assistance to poor working people and manual laborers.

10. For the benefit of poor people and for facilitating the people in general to acquire knowledge, the Mongolian Republic shall carry out education of the children of the working people free of charge.

11. The Mongolian Republic recognizes that the people of the Republic, irrespective of races, religion or sex, have equal rights.

12. The ranks and titles of former rulers or princes or nobles are abolished, and the proprietorship possessed by the Hutukhtu is abrogated.

13. In view of the efforts being made by the working people of various countries in the world for the destruction of capitalism and realization of communism, the Republic of the working people shall exert its utmost to co-operate for the promotion of interest and fundamental object common to small nations diplomatically tyrannized, and to revolutionary working people throughout the world.

In consideration of the existing conditions in the Republic, however, the possibility of establishing friendly relations with capitalistic countries is reserved, it being understood that any country trying to encroach upon the independence of the Republic of the Mongolian People shall be resolutely opposed.

In a letter which appeared in the Chinese press of Peking, the Mongols further show the effects of Soviet inspiration. Mongolia, which never feels the effects of the Powers' diplomacy in China protests against it. Mongolia which knows only the Power of Russia, asks for freedom from the clutches of the Powers. The Mongols refer to matters which they do not understand and which do not concern them. The letter in part reads:

"It should be realized that between the Chinese Government and this Government, there is not the least blocking. The only thing this Government hopes for is an early stopping of civil wars, and the early shaking-off by the Chinese Government of the clutches of the aggressive policies of the Powers. A real Republic should be made to appear and such reformation should be carried out so as to give each of the five races a chance of being blessed with peace and liberty and equality. Otherwise each will be given the authority of settling their affairs by themselves.

"This Government is hoping for the early issue of that sort of mandate by the Chinese Government. Immediately

after the appearance of that mandate, that is, to let the different races settle their own affairs, this Government will name plenipotentiary representatives to the Central Government in order to discuss the plans for perpetual peace and safety between the Chinese and Mongolians.

Mr. A. V. Marakueff, a Russian financial agent, who has somehow become the Manager of the Mongolian Bank and who came to China as a representative of the Mongolian Government gave an interview to the *North China Star* which contains some interesting, if startling information, all of which points to the fact that Mongolia no longer considers itself part of China and no longer is willing to abide by the treaty obligations between China and the Powers. He first calls attention to a Soviet conducted census of Mongolia. He said:

"Mongolia will no longer be a land of mystery," began Mr. Marakueff. "The first census of population of the Republic of Mongolia will be taken in the beginning of next year and the report will be accompanied by a statistical survey of the cattle and sheep raising industries in Mongolia. A prominent Moscow lawyer and statistician, Mr. Vsiehsviatsky, has been invited by the Mongolian Government to organize and to carry out this undertaking.

The Rape of the Customs

He then calls attention to a fact which has hitherto been ignored:

There are now 41 Custom Houses scattering in different places along the frontier and in such inland places as Urga, Uliassutay, Kobdo, and Tzainshaby.

Both exports and imports are subject to a duty of 6 per cent *ad valorem* with the exception of tobacco, the duty on which being 12 per cent. and spirits and playing-cards, duty 30 per cent. The valuation of goods is fixed by the Urga Custom House and is subject to periodical revisions. There are constant complaints against this procedure which is very slow on account of the necessity to file Customs declarations and the lack of experienced Customs officials. However, a school for the Customs employees, recently opened at Urga, will undoubtedly cure this defect.

This particular statement is startling in the extreme because under all the treaties Mongolia is a part of China and is therefore bound by China's treaty arrangements. Under existing treaties China collects a 5 per cent. *ad valorem* duty on all imports. The 6 per cent. duty is a direct blow at the treaties. The additional one per cent. is added not to increase revenue but to indicate independence of China and contempt of the Powers. It is a challenge which ought not to be disregarded by the Tariff Conference, if it even meets. The fact that valuations are fixed by the Urga Customs House rather than by the Inspectorate of Customs in Peking is a further challenge to the Chinese government. The whole enterprise smacks of Soviet propaganda rather than statesmanship. As the trade between Mongolia and the world, except through Tientsin, is almost of no importance, business is in no way affected. But the sovereignty of China is impeached, treaties are *ipso facto* scrapped and the Powers are flouted. It is the Soviet doctrine to have such things accomplished by weak and helpless nations, while they stand behind laughing up their sleeves.

The Railway Struggle

Until the Chinese Government authorized the building of the Taonan-Tsitsihar Railway, Soviet activities in Mongolia were almost entirely of the secret, propagandistic type. The Taonan-Tsitsihar Railway, however, indicated that China was preparing to meet Russian activities in Mongolia. In spite of civil wars and other disturbances, the Chinese Government was becoming conscious of the dangers of Bolshevik efforts to take Mongolia from China not by conquest but by propaganda, not by the will of the Mongolian people but by the machinations of a small group of Soviet trained and Soviet paid officials of the self-created Mongolian Republic. The railway was China's first move in self defence. Russia protested against this move, because the South Manchuria Railway obtained the contract to construct the line, but the Chinese Government ignored the protest and the line is almost completed. The Russians are now planning to construct railways in Mongolia, altogether ignoring the sovereignty of China in the matter. The Russian railways will feed into the Trans-Siberian line, thus continuing the imperialistic Czarist tradition. It will not be long before the Chinese people awaken to the dangers of the situation, before they see the skins, furs, wool, hides and other products of Mongolia, passing through Russia to Europe, instead of through Tientsin and other Chinese ports, as at present.

Japan's Vital Interest

In the Mongolian question, Japan has a most vital interest. As long as the "white" nations hold that the Japanese people are to be excluded as Asiatics, that they cannot emigrate to the great open spaces of the "white" countries, that they may not cultivate the ground or provide themselves with raw materials for their industries, Japan has only Manchuria and Mongolia to look to for peaceful penetration. Mongolia has a population of 2 per square mile. The Chinese do not object to Japanese economic activity in Mongolia so long as such activity does not imperil the sovereignty of China. Japan has no aims on the sovereignty or integrity of China. Japan is reaching a point in her relations with China where the Chinese people look to Japan as a best friend, as a defender of China's rights. What Japan has done for Manchuria, Japan can do for Mongolia. Soviet Russia, on the other hand, has the great steppes of Siberia still to colonize and to cultivate. Russia does not require land for her surplus population or raw materials. Russia is underpopulated and her industries are negligible. Russia has more raw materials than her people can utilize. She hoards and seizes and holds like a miser among nations. Soviet Russia's activities in Mongolia imperil Japan's last chance for an underpopulated place in Asia which may be developed by her surplus population by peaceful means without interfering with the peace of the world. **Soviet Russia's interference in this situation creates a danger spot over which nations are bound to fight, as men fight for their chance to live. And when that struggle comes, China and the "white" nations of the world, in fairness, will support Japan against the arch-imperialist, the seducer of small peoples and the disturber of world peace—Soviet Russia.**

And Yet Again, the Autumn Manoeuvres

CHINA'S annual civil wars may be a pleasant pastime for the militarists who infest the country, but it is horribly destructive of business. Every time, it looks as though the country were to settle down to quiet so that enterprises of industry and engineering might be undertaken, another militarist throws over the traces and hits on a mad trail, which invariably ends nowhere. The stampeds of the military hordes not only destroys the crops of the country, the trade and commerce of the people, but it interferes and impedes the development of the natural resources, the opening of mines, the building of railroads, the draining and widening of rivers and the thousand and one reconstructive

tasks which face a modern nation. In this issue we publish a summary of the situation as regards the railways and other means of communication by H. E. Yeh Kung-cho, Minister of Communications. In this article Mr. Yeh clearly points to the fact that it is even difficult to maintain the *status quo* on the railways, that is, that it is even difficult to keep them up to their present standing. How beyond all expectation is it to make improvements or to build new lines!

To the friends of China in other countries, these constant wars can only be described as the tragedy of a nation not understanding its own position in the world. The Chinese continue

to speak of what they will accomplish by diplomacy, of their wonderful opportunities, of the horrors of inequality, of the barbarism of the foreigners, but they fail to understand that their own inability to establish a sound government, to develop their own country, to give an exhibition of their ability to manage their own affairs in an orderly manner, leads others to believe that they are altogether lacking in governmental ability and that they are failing to win their rights by their own unwillingness to achieve equality. Among the nations of the world, only those are equal which are economically equal, only those can control their own destiny which maintain their position, not by propaganda nor by patriotic speeches and demonstration but by works, by developments, by economic stability. If one studies the course of history in Europe, Asia and America, the story is always the same: the economically independent nation is politically independent. The economically powerful nation, is politically powerful. Where there are works of engineering, where there are modern communications, modern mills and factories, modern commerce and industry, there is political strength and political independence. Ten years of peace in China will make China one of the greatest nations of the world. But the Chinese themselves keep their country in everlasting turmoil. The Chinese themselves, by the lack of foresight and genuine patriotism, keep their country in chaos and bondage.

The Destruction of the Railways

When the railroads of China were built, as few and as scattered as they were, it was hoped that they would be the media for the uniting of the country and the spreading of democracy. The railway program was never completed because the country could never be unified and pacified. Now, the railroads are being abused by the militarists who seize the cars and locomotives, who tear up the rails in their petty wars, who destroy goods in transit. Worse still, each militarist levies on the cars which pass through his territory, so that business is more heavily taxed and commerce is made still further to suffer. The cars and locomotives in the possession of the military men are never sent to the repair shops. The wear and tear on the rolling stock is beyond the purview of railroad men. The result is that the lines have deteriorated and no replacement is taking place. If nothing is done to check this process, it will not be long before the railroads of China will become so much scrap.

In this article, we are not discussing the foreign interests in these roads, the fact that most of them have been built with foreign money and that the interests of the shareholders are not being protected. We are simply discussing the effects on business and development projects in China. For fourteen years, with the exception of the Peking-Suiyuan Railway, practically nothing has been done for the development of China's lines. River conservancy has cost a huge sum of money but the rivers still overflow their dykes. This year, the erratic Yellow River has become so mad in its course that millions are homeless; it is even feared that the river will return to its old bed of some fifty years ago. There was a spurt in cotton mills and flour mills during the end of the war boom, but the Chinese companies were poorly capitalized and worse managed and now there is little to show for the huge investments which were then made. Other industries are simply crawling; they are not yet beyond the most infantile stage.

Only the wars and bad politics of the country are responsible for this condition. There is plenty of money in China and the people are industrious and thrifty. Given a peaceful administration, a few years of constructive endeavor and the money which is not being hoarded in holes in the ground would come to the surface to be circulated among the people and to go into industry and commerce. China can stand such an engineering development as no country in the world has previously known and there would be huge profits in such a development not only for the Chinese but for engineering and merchandising firms in the principal markets of the world. China could utilize the profits from these enterprises to develop into a debt-free modern nation. But instead of following such a course, the Chinese politicians play their eternal game of infantile politics and the Chinese militarists chase each other about the country like a lot of silly fools. For there is no glory in their wars, no sense in their programs and no reason in their proposals. They fight because when the Spring comes they feel an urge to do something and when the Autumn comes they must hold manoeuvres.

Japan—An Example

Japan's history might have proved an incentive to the Chinese, were it not that they suffer from an overweening sense of their inevitable greatness. Japan, in the short period of fifty years, achieved a position of equality with Great Britain and the United States in the family of nations. This was not accomplished, as some think, by the defeat of Russia, although that was a factor in the making of Japan. It was accomplished by the organization of Japan's economic life on a modern basis. The development of the iron and steel industry, the textile industries, railways and waterways, communications of every sort, the utilization of water power, the electrification of the country did more for Japan than the victories in Manchuria. They made Japan a great Power, because Japan became economically a sound Power. The proof of this lies in the fact that Japan can go into the markets of the world and can borrow hundreds of millions while China cannot get a single dollar anywhere. Yet, look at the resources of China and Japan. Look at the population of China and Japan. The smaller country, Japan, commands respect because her people work and her officials function. The large country, China, is in a ridiculous position, because her people are oppressed and her officials play. Japan is in a position to dictate terms with regard to the Pacific while China is begging for a 2½ per cent. tariff increase.

We have no desire to make China appear to be ridiculous. We simply call attention to glaring facts and wonder in all friendship at the unwillingness or inability of the Chinese to see themselves as others see them, to save themselves from eternal backwardness by a little constructive genius and a little civic interest. The Meiji statesmen in Japan might have taken advantage of the great changes made at that time to labor in their own interests. But they sacrificed themselves for the sake of the country. They worked for Japan. They changed the character of the country and rejuvenated the interest of the people. Their one idea was that Japan should be the equal of any nation on the face of the earth and that that equality was to be won not begged for. In the end, Japan accomplished her purpose. To-day, China is still nowhere. Instead of the front pages of newspapers carrying reports of great developments in China, as they do of developments in Japan, they again carry the tale of one militarist going after another, of another railway line cut, of more men shot in warfare, of continued suffering of the people. What is the use of it all and where will it end?

Again we say to the Chinese: study the history of Japan and gain strength and wisdom therefrom.

* * *

Credit Insurance as a Trade Builder

FROM OUR LONDON CORRESPONDENT

SOME few years ago certain clever and far seeing underwriters in England conceived the idea of credit insurance, not only from an insurance point of view but with the idea of encouraging export trade from which they would be able to build up a large and it was hoped, profitable revenue. Wise men in the financial world—in their hide-bound conservatism—predicted disaster, merchants however, on the other hand, saw that they could increase their turn-over without having to find additional capital, since they had the assistance of a company prepared to indemnify them for any losses incurred over a certain amount they were themselves prepared to undertake.

The result was that the Trade Indemnity Company, with Mr. Stanley H. Spain as underwriter, and Mr. Cuthbert R. Heath as chairman, with a comparatively small capital, made good. Then the bankers and others who originally scoffed at the idea, began to see that there was something in the idea, and finally the Government approved of the suggestion until business increased so rapidly that the original capital was quintupled and the company to-day stands with £250,000 paid up.

Although in the first instance, from treading on unknown ground the company, naturally went somewhat gingerly, the results proved so undeniably good that the Government's attention became so focussed on the new idea, that they requested the Federation of British Industries to go thoroughly into the matter and issue a report thereon. Meanwhile the original company commenced a policy of expansion and established branches and agencies in many parts of the world, a circumstance which proved their wisdom

since the report issued is of such a favorable nature as to encourage a number of the composite insurance companies to forthwith commence operations in credit insurance. The original company, however, from its more intimate knowledge of the conditions pertaining to the business, based upon experience, is established on practically unassailable lines, and is by no means afraid of competition. In fact they maintain that there is business for all, and that the wider the knowledge of the scheme the greater the amount of business that will result and the greater the benefit to trade in general.

The report of the Federation bears this out to a very large extent, and as the scheme is likely to play a very prominent part in increasing the volume of trade with the Orient, the salient features are well worth perusal. Briefly, this is the gist of the Federation's finding.

The outline a system which, they submit, would facilitate the granting of longer term credits. The problem involved, it is pointed out, is that of placing companies insuring credits, in such a position that they should be able greatly to extend their operations, and, secondly, of providing policies of such a nature as to facilitate the discounting of bills or advances to the manufacturers or exporters against the insurance policy. It is generally accepted, the report points out, that, a greatly increased volume of export trade could be done provided that credits could be granted more freely to the foreign buyer, and, from an industrial point of view, the advantage in the extension of a system of credit insurance would lie in the possibility of enabling a manufacturer or other exporter to obtain the financial facilities necessary.

Discussing the question of catastrophe risks—those occasioned by war, revolution, or other disaster—the committee remark that it would seem that these can only be insured as excess risks, and it is suggested that this special re-insurance should be undertaken by the Government itself on the following principles:

That the Government should agree to reinsure for a small premium an agreed proportion of all the losses above an agreed amount in any one year on credits insured in respect of goods of United Kingdom origin, by any approved company or companies, e.g., assuming that the agreed amount of loss was 100 per cent. of the premium income of the approved company any loss in excess of this amount might be borne, say, as to 90 per cent. by the Government and as to 10 per cent. by the company.

To facilitate the discounting of bills or advances to the exporter on the security of the policy, it is emphasized that two points must be met:

(1). The policy should not be invalidated owing to the giving of false information by the assured or the suppression by him of information which should have been given. The Federation would note that in actual practice they doubt whether policies would frequently be invalidated on those grounds. It seems highly improbable than any trader of substance would incur the risk to his reputation and general standing and to his chances of getting further insurance of this character by deliberately giving false or insufficient information.

(2). The policy should provide for payment of loss immediately on failure of the customer to meet the obligation on the due date.

Referring to longer term credits for one, two, or even three years, so frequently required by purchasers of capital goods, such as power plant, machinery, rolling stock, road transport plant, agricultural machinery, milling plant, etc., the opinion is expressed that the export of these goods is particularly important since not only do they bring direct immediate orders to this country, and particularly to those trades that are at the moment suffering most severely from under-employment, but they frequently lead to a valuable trade in repairs, replacements and extensions. Moreover, they would tend directly to develop production in the countries to which they are sent, thus improving the buying capacity of those countries and developing them as future markets for British trade.

It is confidently believed that the issuance of this report will be shortly followed by largely increased applications for credit insurance, upon which many of the first class companies are now preparing to embark. The fact of being able to extend credit up to three years must in itself have a wonderful pulling power and materially facilitate in the booking of orders the terms of which at the present time are unacceptable to buyer and seller alike.

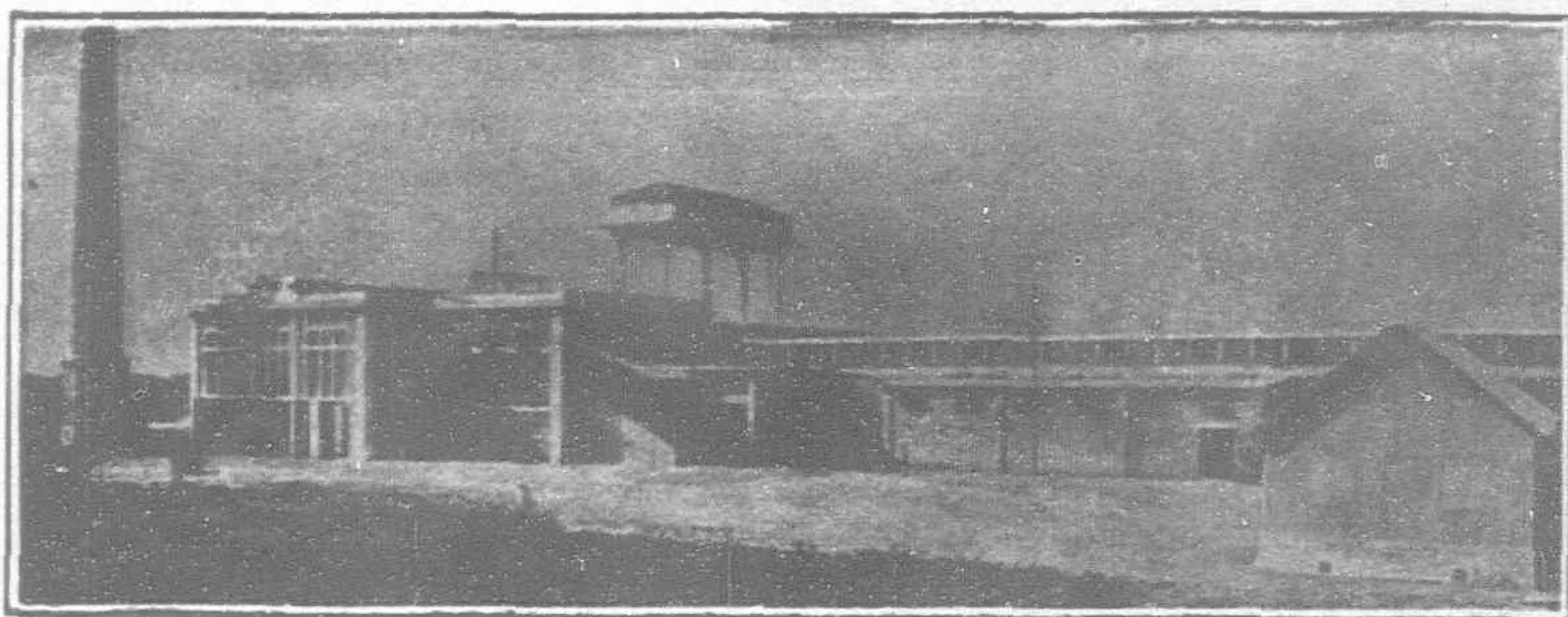
A Builders' Bible

"THE CHINA ARCHITECTS' AND BUILDERS' COMPENDIUM 1925." \$10. North-China Building, Shanghai.

The China Architects' and Builders' Compendium for 1925, the second edition of this useful work, has just been published. It deals with everything relating to building and constructing in Shanghai and Hankow, though most of the information can be applied to any of the Yangtze ports. Part 1 gives information regarding taxes, land fees, land values, building rules, and charges for gas, water, electricity and telephone service. Two good maps are also included—one of Shanghai and one of Hankow.

Part 2 contains technical information relating to weights of various local building materials, local data on costs, properties of materials, quantity surveying, foundations, etc. A very useful addition to this year's edition is the inclusion of the conversion tables of weights and measures most used by architects and builders in the Far East. Advertisements are so arranged that descriptive matter relating to similar products is kept together, making reference a simple matter.

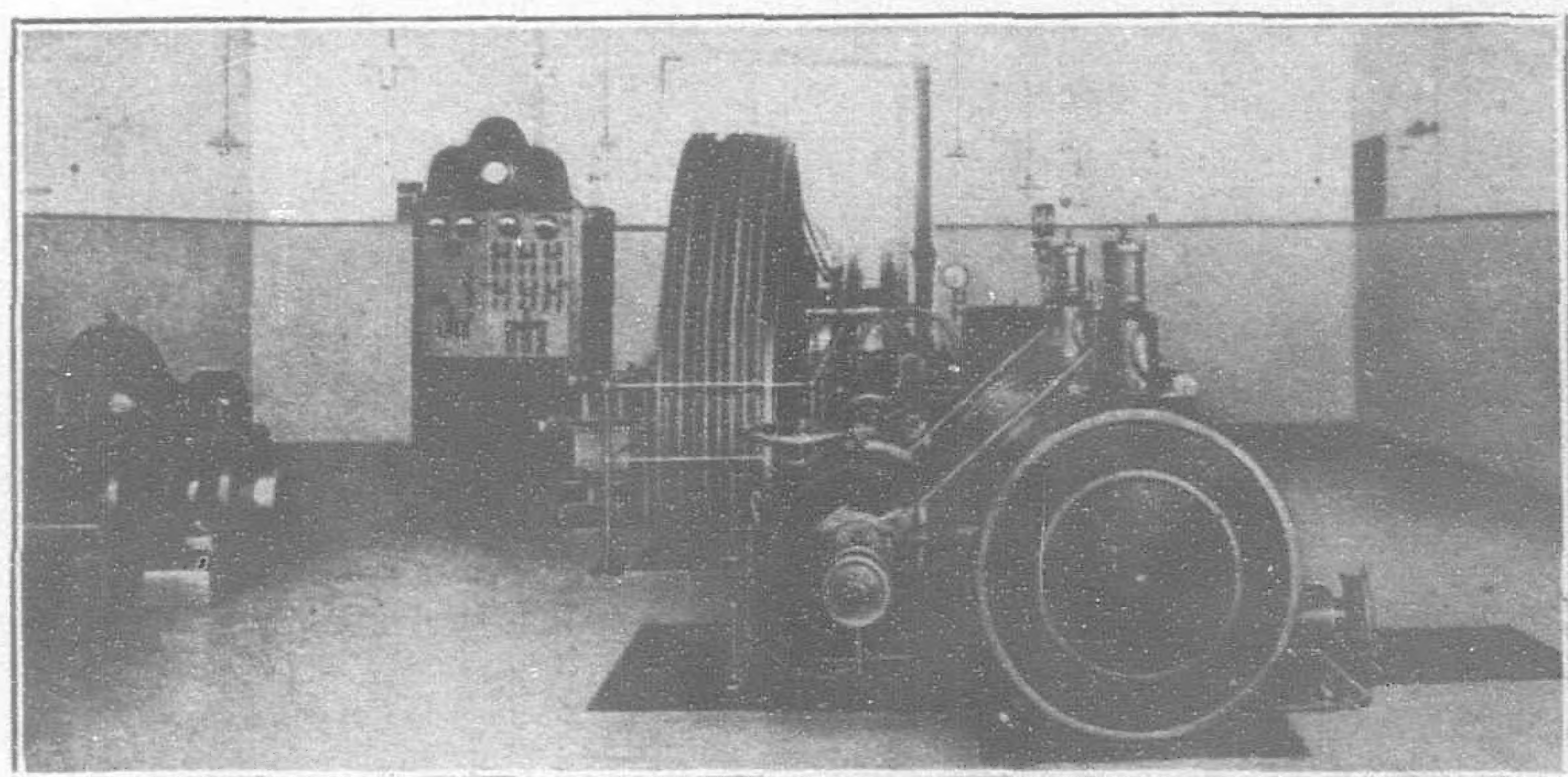
The work should be welcomed by all who are interested in civil engineering or constructional work in China. It is well indexed and illustrated.



Dah Tung Cotton Spinning Mill. Tsungming Island (near Shanghai)

The Dah Tung Cotton Mill on Tsungming Island

On the island of Tsungming, not far distant from Shanghai, the Dah Tung Cotton Mill recently started work, and the up-to-date plant installed has aroused great interest in industrial circles in China. The inception and financing of this concern was wholly carried out by the natives of the island and the commercial and technical management was entrusted to Chinese textile specialists. The mill is in immediate proximity to rich cotton fields and is equipped with a 440 b.h.p. Sulzer Uniflow Steam Engine for driving the spinning machines. Power is transmitted to the shafting by ropes. The mill has at present 10,000 spindles.



Sulzer Uniflow Steam Engine G.H. 61, 400 H.P. installed at Dah Tung Spinning Mill, Tsungming Island (near Shanghai)

Japan's Stand at the Tariff Conference

A Large Body of Chinese are Opposed to the Begging Attitude Adopted by the Chinese Government

Internal Reforms Must Precede International Equality

THE opening of the Tariff Conference was exactly what might have been expected. The Chinese Government demanded Tariff Autonomy. The Foreign Governments were prepared to meet China more than half way in the accomplishment of her national aspirations. They suggested that, after the conference had concluded those questions which the Washington Conference delegated to them, they would consider those proposals which China desired to make with regard to Tariff Autonomy. One of the proposals at Washington was the abolition of *likin*, a tax which destroys internal trade and industry of China, impedes foreign commerce and intercourse and proves absolutely ruinous to the political fabric of the country, because it gives corrupt politicians an opportunity to impose illegal taxation and to pocket huge sums which imperils the people of the country and leaves the government without revenue. *Likin* is a curse to China, more a curse to the Chinese than to the foreigners of the country. If China were in a position to abolish *likin*, the country would become infinitely more prosperous. A middle class of merchants and industrialists would rise. The Government would be in a better position to collect taxes and to impose national revenues because the people would not be taxed almost beyond endurance by these illegal and harmful taxes. The politicians and militarists naturally do not want *likin* abolished because they pocket the money therefrom themselves. In their efforts to deal with Tariff Questions without reference to the Washington treaties, they hope to evade the whole question of the abolition of this mischievous impost. To that the Powers cannot agree.

There are many Chinese who feel that the Tariff Conference should not have been held at this period of disturbance, because in view of China's internal conditions, it is impossible to do the thing properly. Mr. Tong Shao-yi issued a statement previous to the holding of the Conference which has received a wide endorsement throughout China. In it the veteran statesman makes it clear that China must not beg, but should wait until she can dictate. His statement follows :

"The problem of China's tariff was brought before the Washington Conference by the Chinese delegation. This question has not yet been settled and the Peking Government has now invited the nine Nations signatory to the Washington Treaties to attend a Tariff Conference in China and has set a date for this meeting.

"According to the third clause of the Washington Tariff Agreement there is to be an increase of 2½ per cent. on the import duty and from 2½ to 5 per cent. on luxuries. The Tariff Conference is called to arrive at an agreement with regard to this question. If an agreement is reached, our national revenue will be increased by approximately, Tls. 19,000,000, which is not a very considerable amount. Moreover, we are bound to accept these terms for a period of years and we have no increased control over the administration. Under these conditions it appears to us, that we are begging favours of the foreign nations, a condition to which no sovereign state should be required to submit.

"Although, under the revised arrangements, we might be permitted to make still another increase after a certain length of time, and that even autonomy might be granted to us after still a further lapse of time, we are nevertheless uncertain as to whether we shall obtain all the benefits which are provided for in the treaties, because in accordance with the diplomatic practice prevalent in China, new provisos always arise to prevent the fulfilment of treaty obligations. The foreign Powers take advantage of such incidents to postpone the fulfilment of the treaty promises, with the result that nothing is accomplished. The diplomatic history of China will verify the truth of this statement.

"But, even if the new treaties are signed, it is doubtful whether the signatory Powers will be bound to live up to the new obligations. For there are the nations with whom we are in treaty but who are not to attend this Conference to provide the 2½ per cent. additional duty, and in accordance with the operations of the Most Favoured Nation Clause, the signatories will have all the benefits which the non-signatory nations may enjoy. What steps can we take to prevent these contingencies from arising ?

"Our representatives at the Washington Conference made a serious mistake by not protesting against the present administration of the Customs and by agreeing to the Tariff Conference. Now, the Peking Government continues this stupid policy by consummating this agreement. The purpose of the Peking Government is simply to indicate to the Powers that China is unified and to lead the people to believe that their influence with the foreign Powers is considerable. They hope to utilize this impression to check their opponents in the country so that they may continue to remain in office, so that they may negotiate huge loans to satisfy their extravagances and to enrich themselves. It is difficult to calculate how much the country will suffer from the new obligations and what an additional burden will be placed on the people. The results of this Conference can bring us only a great loss; surely the country and the people have nothing to gain from it.

"Our policy should be to demand the right to fix our own tariff rate, adjusted to our own needs. There is no need for a Conference, for the very meeting of such a conference is proof of the lack of recognition of our right to tariff autonomy. We ought not to beg the Foreign Powers to grant us tariff autonomy; this should be inherent in our sovereignty. When the time comes that we have created conditions suitable to the achievement of this end, the Powers will not be able to deny us our rights. Before this can be accomplished, we must have a legal government which commands the respect of the people. Before we can achieve tariff autonomy, the Government will have to budgetize its expenditures, will have to reconstruct the army, improve communications, reorganize the judicial system, develop popular education and industry, adjust foreign and domestic loans, abolish *likin* and reform the currency. These problems directly affect the welfare of the people and no government should neglect them. The people should reflect upon the past and reach some decision as to the future.

"Now, the whole nation is demanding the abolition of unequal treaties, but if the Conference is held, it can only mean that we shall suffer from additional inequality. The Government is attempting to mislead us, but are we as citizens to remain silent? On the eve of this Conference, we should go carefully into the advantages and disadvantages of this meeting. At this time when we are living under an iniquitous government, we must be vigilant of its actions; we must prevent it from bringing further disasters upon the country internally; we must prevent it from making further sacrifices of the sovereignty of the nation externally. Whether the country continues to exist or vanishes, rests with you. Fellow-countrymen! Take notice."

Mr. Hioki, the Japanese delegate to the Tariff Conference realized that China must go through the processes which made Japan great. He realized that internal anarchy do not go hand in hand with international equality. On behalf of China's great neighbor, Japan, he suggested the course of events in China which would make that country one of the greatest of the world. It was in a spirit of friendship, with the utmost good-will and candor, with a hope for accomplishment that Mr. Hioki made the suggestion. The question is: can China fulfill the hopes and wishes of her friends? Does China contain the men, the forces to accomplish

a great program of reconstruction? It is impossible to believe that a nation of 400,000,000 cannot produce the leadership and intellect to accomplish the equality which comes only from hard work, reconstruction and unity.

Mr Hioki's opening address at the Tariff Conference follows:

"The Japanese Delegation have come here with the serious conviction that some definite results in the direction of a common purpose and a common understanding between China and other Powers may well be attained at the present Conference. In now pledging our whole hearted co-operation to this end, we are confident that its deliberations will be marked on all sides by fairness and moderation in spirit and simplicity and directness in method, which alone can ensure the success of any international conferences.

"Japan has always watched with keen and abiding interest every effort made by the Chinese people for the realization of their legitimate national aspirations. She has herself been subject at one time to unilateral restrictions upon her freedom of action in matters of fiscal and judicial administration. The present struggle of the Chinese people to be relieved of those restrictions has had its counterpart in her own history. It may, therefore, be of some interest to review as briefly as possible the path which Japan feels she has opened up for the solution of the same problems that are now engaging our attention.

"In 1858 Japan for the first time opened her ports to foreign trade. Under the commercial treaties that were then concluded she had to concede extraterritorial rights, she had to undertake unilateral engagements in the matter of the Customs tariff. In 1866 these treaties were revised, but our import tariff remained fixed for the following 33 years on the general basis of 5 per cent. *ad valorem*. Similar restrictions were imposed on our exports. The Japanese people, dissatisfied as they were with such arrangements, were sensible of their own shortcomings. They perceived that the weakness of their international position was but a result of their internal weakness. They saw the futility of all attempts to remove the effect without removing its cause. In this conviction they set to work silently, steadily, resolutely, with their eyes fixed upon the completion of all reforms needed in their domestic administration.

"The treaties as revised in 1894, provided for a graduated customs tariff at rates ranging generally from 5 to 15 per cent. The new tariff was to come into force upon the expiration of five years from the dates of the signatures of those treaties and thenceforth was to remain operative, for the period of 12 years. It marked a step forward to a solution more in keeping with modern requirements, but it continued to be unilateral without any *quid pro quo* being undertaken by the Powers. In 1899, Japan succeeded with the willing consent of the Powers in terminating all extraterritorial jurisdiction within her borders.

"But it was only in the year 1911," continued Mr. Hioki, "that through another revision of treaties the unilateral conventional tariff was replaced by bilateral engagements on a more rational basis of mutual concessions. It meant for Japan 58 long years of patient and energetic work expended in effecting many necessary reforms in various branches of her government.

"China," he said, "is still following the same path that we once pursued. The difficulties, the embarrassments and the perplexities that confront China to-day have once been ours. The Japanese Delegation will approach the problems before this Conference with sympathy and understanding and with intimate apprehension of the Chinese position. I am happy to state at the outset that the Japanese Delegation are fully prepared to consider in the friendliest way the question of tariff autonomy which appears in the agenda presented by the Chinese Delegation. However, an immediate duty is incumbent upon us who are here assembled.

"The present Conference has been called together pursuant to the provisions of the Washington Treaty of 1922 concerning the Chinese Customs tariff. The treaty has in view the provision of an increase. Customs revenue for China in order to assist in the financial rehabilitation of the country. It requires of this conference the consideration of two distinct matters. In the first place, Article 2 provides that the Conference shall take immediate steps to prepare the way for the speedy abolition of *likin*, and for the fulfilment of the other conditions laid down with a view to levying a surtax provided for in the previous treaties between

China and other Powers. In the second place, Article 3 provides that the Conference shall consider certain interim provisions prior to the abolition of *likin* and authorize the levy of a surtax at a uniform rate of 2½ per cent. *ad valorem* and, in the case of certain articles of luxury, at a higher rate not exceeding 5 per cent. As to the levy of a surtax under Article 3, the rate is fixed at 2½ per cent. *ad valorem*. Obviously it cannot be altered without giving modification to the terms of that Treaty.

"At the time of the Washington Conference it was estimated that this surtax would secure an additional revenue amounting to approximately 29 million dollars in silver. The amount of such revenue is sure to increase with the constantly growing volume of trade as the Chinese Customs returns clearly testify. Again there will also be an annual Customs surplus available after the existing charges on that revenue have been met. Our financial experts are of the opinion that, with these new sources of revenue it will not be difficult to work out a feasible plan that would meet the needed administrative expenditure of the Chinese Government and would at the same time further the general financial adjustment of China. The Japanese Delegation will, on another occasion, have the honour of tendering before this Conference their concrete suggestions on this subject. We are not, however, disinclined to take up any proposal which might be put forward with a view to the levying of a reasonable surtax higher than 2½ per cent.

"Such a proposal may be considered as falling within the terms of Article 2 of the Treaty. But since this would constitute an intermediate step prior to the total abolition of *likin*, it should be requisite for China to effectuate at least a partial abolition of *likin*, as well as to fulfil certain conditions provided for in the Treaties between China and other Powers.

"Returning to the question of tariff autonomy, the Japanese delegation are willing, as I have already stated, to consider sympathetically and helpfully any reasonable plan of the Chinese Government looking to the realization of their national aspirations in this regard. Evidently the goal could be reached only by successive stages and we rest assured in the belief that an immediate and unconditional surrender by the Powers of their existing treaty rights is not within the contemplation of China herself.

"At this juncture," continued Mr. Hioki, the Japanese Delegation venture to suggest the following alternative plans that might, as an intermediate step, be adopted for a definite period to be agreed upon. First, that a statutory tariff on a fair, and reasonable basis be established for general application, subject to the provisions of special conventional tariff on certain specified articles to be agreed upon separately between China and each of the Powers directly interested; or secondly, that a graduated tariff, so devised as to be acceptable to the Powers concerned, be established at an average rate of not more than 12½ per cent. *ad valorem* and generally in a manner consistent with the provisions of Article 2 of the Washington Treaty. The inauguration of a *regime* of tariff autonomy in China implies the existence of an adequately strong and unified government and pre-supposes a complete removal of all restrictions which might impede the freedom of intercourse and trade between China and other Powers.

"We confidently hope," said Mr. Hioki, "that, endowed with remarkable qualities of self-government and supported by the growth of nationalism now so manifestly asserting itself in the country, the Chinese people will succeed in accomplishing reforms towards these ends, as much desirable for their own welfare as for the common good of all nations. Moreover, the Japanese Delegation believe that by going through a practicable step such as I have taken the liberty to outline, China would be able, without fail and without injury to herself or her friends, to accomplish the huge task of bringing her fiscal administration upon a sound and scientific basis and ushering in a new era of prosperity in the Republic.

"In conclusion," said the speaker, "I desire to reaffirm on behalf of the Japanese Delegation our faith in the spirit of friendliness which animates this important gathering. We ardently hope and believe, that by frank discussion and neighborly co-operation, by mutual assistance and concession, and by the exercise of due respect for one another's rights and interests, the present Conference will find equitable solution for every problem before it to the satisfaction of all, and thus demonstrate its will to live and let live."

Financial Independence of the Administration of Communications of the Republic of China

By H. E. Yeh Kung-Cho, Minister of Communications

NEARLY half a century has elapsed since China began to possess modern means of communications. A special department of the Government was established 20 years ago to attend to their administration and development. Still only a few people possess a clearly defined idea of the nature and functions of communications as related to society and the government. For a modern society communications are as indispensable as water and air to human life. Without them civilization steps back immediately to the mediaeval ages.

This idea is clearly understood in foreign countries; so they zealously work for the improvement of communications. Progress serves only to stimulate further efforts, and every day brings forth new glories in achievements, either in the way of invention or expansion. China, on the other hand, lags in the march of progress, failing even to maintain what means of communications she has already constructed.

It is a fair question to ask, what is the cause of China's backwardness? An attempt was made indeed to lay the foundation of the systems of communications on a solid basis, when in the third year of Hsuan Tung (1911), a system was adopted providing for the independence of the administration of communications. In this system were incorporated the best points of all countries, after a careful and thorough study of the subject. Financial integrity of the systems of communications is necessary, because as commercial enterprises, they must have their funds at their own disposal and further safeguarded by accurate accounting. Hence the Special System of Accounts.

It is to be observed that financial integrity of the Communication Systems is provided for in the laws of all foreign countries. The best known system is to be found in the new constitution of Germany, Article 92 of which states:

"The national railroads, irrespective of the incorporation of their budget and accounts in the general budget and accounts of the Commonwealth, shall be administered as an independent economic enterprise, which shall defray its own expense, including interest and the amortization of the railroad debts, and accumulate a railroad reserve fund. The amount of the amortization and of the reserve fund, as well as the purpose to which reserve may be applied, shall be regulated by special law."

Article 30 of the Japanese Accounting Law provides that in case of necessity, when the law is not applicable, a special law of accounts may be established. The first article of the Japanese Railway Accounting Law also expressly states that for the purpose of railway administration and with the object of safeguarding railway funds and regulating the disposal and use of the funds, all the earnings and miscellaneous revenues may be applied to the use of railway enterprises, and an independent system of accounts may be established.

The idea of financial integrity is to give recognition to the fact that the accounts of government-owned enterprises are different from those of ordinary government offices. So a separate system, adequate and suitable for the purpose, must be established. The fundamental principles underlying such a system should, however, be the same as those of the general system of accounts, and the authority for its establishment should be derived from the accounting law of the country. (The existing railway accounting regulations of this Ministry, for instance, are based upon Article 34 of our Accounting Law, which states that in case of necessity when this law is not applicable, a special law of accounts may be established). Such a system is, therefore, a part of the general system of finance of the government and is subject to the supervision of the law of the country.

From the foregoing, it will be seen that legally the system of independent accounts for government-owned enterprises is well established. It remains to be shown in the following that unless such a system is established, no public utility or other enterprises of the government can be prosperous.

To illustrate, the example of commercial concerns may be taken, for in the final analysis the principle determining the success or failure of a government-owned enterprise is the same as that of a commercial concern. The first essential to the success of a commercial concern is to have proper accounting; business accounts must be kept strictly separate from household expenditures, otherwise there will be no way to ascertain whether the business is making money or not. When the business is of the nature of partnership or company, such a separation of accounts is imperative. The same principle governs the operation of government-owned enterprises. In the same way their accounts must be kept strictly apart from those of governmental expenditures. When the enterprise is financed by the joint capital of the people and the government, the necessity for a separation of accounts is obvious.

The fact that government-owned enterprises are run primarily for the benefit of the public and secondarily for profits does not alter the fact that they must be run successfully. No one can bring success to an enterprise when it has no capital to begin operations with or when its funds are being taken away as soon as it makes money. So when the government plans to develop an enterprise, it must appropriate for it a sum of money to be used as capital, and this capital must be applied exclusively to its development. If the enterprise makes money, the funds at its disposal must be used primarily for its development and expansion, and should not be appropriated for other purposes until its needs are taken care of adequately. On the other hand, failure is as certain as that the sun will rise, if the funds of an enterprise are treated in the same way as an ordinary source of government revenue to be appropriated at random. The system of independent accounts has for its purpose the preservation of the funds of government-owned enterprises for their own use first, hence the necessity of its establishment.

Chinese Government-owned enterprises are still in a stage of infancy. Protection is needed to nourish their growth. On account of the poverty of the national treasury, no financial assistance has been given or can be expected from this quarter. They must look to themselves for mutual aid. A judicial adjustment of the funds at their disposal is necessary to render help to those enterprises which are still undeveloped from the profits of the established ones. This will be impossible if the funds are taken away, and the result will be to kill off, or arrest the progress of all the enterprises. For their welfare, protection in the form of an independent system of accounts is absolutely necessary. There is another reason why the funds of Government-owned enterprises must be protected, as it affects not only the enterprises, themselves, but also the credit of China. Most of the Government-owned enterprises were financed originally by foreign loans. Foreigners are interested in their having a sound financial system. So unless their funds are safeguarded from misappropriations, their credit is bound to suffer, which will naturally give rise to complaints and criticisms. The demand for protection of Government-owned enterprises and the credit of China is another reason why an independent system of accounts should be established.

The establishment of an independent system of accounts is dictated, therefore, by reasons of legality and necessity. It must be pointed out as a conclusion drawn from the facts mentioned in the foregoing that independence of accounts should be established not only in the narrow limits of Communications but it should have

a wider scope to apply to all Government-owned enterprises. This seems to be lost sight of in China, and it has been thought that it applies to communications alone, since the latter were the first to adopt the system. Misunderstanding has given rise to criticisms, which are not well-founded, in view of the fact that the system in its methods and operations, is even more elaborate than the ordinary system of accounts, providing a great many more safeguards against corruption and dishonest practices. The usual procedure of examination of the budget and accounts by the authorized Government Bureau of Audit is provided for. Furthermore, the accounts and statistics are published annually and made available both in China and abroad, thus wide publicity is given to them.

China's trouble lies not in the want of a good system but in the fact that the good system is not effectively enforced. During the last 13 years, the so-called financial integrity of the administration of communications exists only in name. It has been trammelled and put under fetters. There is no public opinion to come to its rescue and restore it to its proper function. As a result the revenues from Communications during the last 13 years have been diverted to other purposes, and loans have been contracted ostensibly for the purpose of their development but actually to meet the requirements of governmental and military expenses. In more recent years, the revenues of the railways have become a source of income to militarists, who appropriate them directly. The Kin Han Railway alone supplies more than \$10,000,000 annually to military requirements. The funds that have been seized from other railways and telegraph offices are enormous. Not satisfied with merely commandeering the earnings, railways and telegraph offices have been obliged to borrow money at a high rate of interest to meet these military demands. There have even been cases of high military officers borrowing directly from the merchants pledging the revenues of communications as security, and pressure has been brought upon the railways and telegraph offices to pay back the loans accordingly. It is estimated that up to the end of the 13th year of the Republic no less than \$180,000,000 have been appropriated, seized and taken away in one way or other by different forces. If interest on this amount is calculated, the total amount comes up to \$250,000,000. The funds at the disposal of the means of communications are drained dry and the revenues yet to be earned are mortgaged. The means of communications are left with no funds to carry on their operation. If the independence of accounts had been enforced, such an enormous amount of money could be used, in the first place, for the amortization of debts, which would greatly lessen the burden of indebtedness; and in the second place, it might have been used to start new enterprises. The benefit that would accrue from this would be even greater. But what do we find now? The funds of the railways are exhausted, and debts are piling up. Work on incompleting lines is interrupted, and deterioration overtakes the existing lines, which are gradually becoming useless. There is no money to buy even the material required for daily use, and wages are overdue. Bridges are decaying and falling. Rolling Stocks are broken down and sadly in need of repairs. Traffic is in daily danger of interruption, in consequence of deterioration and lack of repair. The telegraph service has the same sad story to tell. Loans contracted for its improvement and expansion have been appropriated by the Government for other purposes, and its revenues have been seized by the provinces. Payment of interest on loans has been long delayed, and telegraphic lines have been allowed to deteriorate without the means for repairs or extension.

The railways and telegraph, for which the energy and labor of several tens of years have been spent, are now on the brink of bankruptcy. Navigation and the post fare better, but this is because navigation is still in the stage of infancy. The post is only able to maintain itself. If no radical departure is made from the present way of doing things, it is reasonable to expect that the railways, and telegraphs will become so deteriorated in a few years as to become useless. In that event, the difficulties and sufferings that will overtake the nation and the people will be impossible to describe.

Recent events may serve as a warning of what the future has in store. During the last few months traffic was interrupted on account of war. A loud cry of suffering rose from the people. But this was only a temporary state of affairs. Compared with this how much greater would be the suffering should all the railways and telegraphic lines be broken down at the same time on account of deterioration. Repairs can not be completed in a day, and it is questionable whether the Government, poor as it is now, is financially able to undertake repairs on a large scale.

Facing the possibility of total destruction in the not distant future, the immediate problem confronting the country is to maintain the *status quo* of the means of communications, that is to prevent them from becoming worse. Other problems of improvements and expansion are of secondary importance. To merely maintain the *status quo* the first question to which we must direct our attention is how to enforce the financial independence of the administration of communications, which will preserve their revenues for their own maintenance and improvement and for the completion of unfinished lines.

The importance of financial independence of the administration of communications must be clearly understood by the people and popular support must be given to it. If this is obtained, it may then be said that the true foundation of communications is laid. Gradual and steady improvements may then be planned. As the means of communications improve, all other business will progress in their train. In the future when the income from communications is increased, any surplus after deducting what is needed for the amortization of debts, expansion and improvement and for the reserve fund, will naturally be handed over to the Government to supplement its treasury. But if the foolish policy of killing the goose to get the golden eggs be continued, it will be not only the communications business that will suffer but all other new projects also. We tremble when this point is considered. Moreover, we are reminded all the time of the heavy foreign investments in our means of communications by the persistent cry for international control of our railways. If we do not ourselves plan a remedy now, others will presently plan one for us. We can not forbear to mention the direful consequences this will bring to China.

This Ministry being entrusted with the administration of communications, we are more thoroughly acquainted with the real state of affairs. We are in duty bound to lay before the Conference what we consider as the real danger that is threatening the existence of the means of communications and beg to submit herewith our proposal of remedy, which is summed up in the recommendation to preserve and enforce the financial independence of the administration of communications.

Letter to the Ministry of Finance from the Ministry of Communications

With the opening of the Rehabilitation Conference* it is necessary that the respective departments of the Government each submit its plans of reorganization and reconstruction so that they can be carried out with the approval of the Conference.

Aside from the administrative problems which concern this Ministry alone and which the Ministry of Communications has already submitted to the Rehabilitation Conference for consideration, the problem of finance in its bearing upon the systems of communications must be given due attention. As the Ministry of Finance is in charge of all government financial matters of the country, it is deemed proper that the problem of making good the financial losses in the recent years and of devising ways of adjustment must be submitted to the Rehabilitation Conference for its consideration through the Ministry of Finance. If the Ministry of Finance has already submitted its own plans, it is hoped that it will send in the enclosed memorandum with annexes as a supplementary document.

Memorandum of Financial Readjustment

The fact is well admitted by those who have made a study of the policies of communication and transportation in any country that these enterprises are highly necessary to the development of its civilization and industry and to its military affairs and national defence. China cannot at present boast of an adequate system of communication and transportation. In the case of navigation, she has not a single government enterprise to speak of, and those started by the merchants have seldom been encouraged or assisted by the Government. In the case of post and telegraph, there is still ample room for improvement and extension, although the important cities and towns throughout the country can all be reached now either by mail or by telegraph. As to railways, it must be admitted that, except in a very few cases in which China had made plans of her own to attain the above mentioned objects, most of the railways

*A Conference called during 1925 to reconstruct the Government of China. It failed to accomplish anything.

were built with foreign loans, with plans all initiated and laid down by the creditors.

Since the very beginning, China has succeeded in constructing only a few of the trunk railways of the country, with little or nothing else to boast of. While the lack of funds at the outset has been largely responsible for this inactivity, the fact that the incomes of the railways have frequently been diverted has made extension impossible and brought about the present condition. In the recent years, instead of making an effort to maintain these means of communications and transportation in their infancy, there has been repeated encroachment upon them. The retention of the telegraph and railway revenues to meet military and administrative expenses, the mortgage of railway and telegraph property for loans, and the non-payment of transportation and telegraphic charges are direct encroachments which are frequent and which affect very seriously the financial conditions of the railway and telegraph administrations. The indirect encroachments are more frequent and numerous, which consist in the detention of cars and locomotives, interference with the appointments of officials and the carrying on of ordinary business, forcible seizure of telegraph and telephone wires, issuance of unlimited number of free passes, despatch of official telegrams without paying for them, appropriation of railway and telephone and telegraph materials, and finally, destruction of the different kinds of expensive engineering work. The result is that, according to an estimate made at the end of September of the 12th Year of the Chinese Republic (1923), the total indebtedness of the Ministry of Communications runs over \$707,300,000. This figure has not changed much during the last two years.

It is indeed sad to say that the present enterprises of communications are in a very bad state. The fact that all engineering structures are breaking down and equipments deteriorating presents a serious danger to the continuance of the enterprises. That the incomes can not meet the expenses and that the debts are piling up is the financial phase of the peril. What is still worse is a steady undermining of the economic foundation, which is necessary to the maintenance of a sound financial policy. In the past, the Ministry of Communications had always been able to meet its obligations at home or abroad. Although there had been delays sometimes in meeting the internal obligations, for which satisfactory arrangements were always possible, the Ministry had never failed, in spite of all financial difficulties, to maintain its credit abroad. It was for this reason that the Ministry had then still a sound financial policy. But the case is quite different in recent years. The Ministry has not only failed to make good its internal loans, but also failed to meet its obligations abroad. It was only with great difficulty that the Ministry managed at the end of last year to make good its Hukuang loans. The Japanese Legation has repeatedly pressed for repayment of principal and interest on the Yokohama Specie Bank Loan. The Great Eastern and the Great Northern Cable companies are about to discontinue the practice of sending cables on credit, for the Chinese Government has failed to pay either the interest or the principal of their loans. The next payment for the coupons of the German portion of the Hukuang Bonds—having been postponed last year pending a diplomatic settlement—will require a sum of no less than \$3,000,000, and there is no definite plan yet to meet this obligation although it may soon fall due. There are many other minor loans for purchase of materials from abroad, which have not yet been made good. The internal indebtedness includes many short-term loans from the Chinese banks, bonds and promissory notes issued by the different railways (not counting the funds which should be reserved for redemption of railways but which have not been paid over). All these short-term loans have been extended again and again, and the different kinds of bonds and notes which are held by the Chinese and foreigners alike have not yet been redeemed. Failure on the part of the railways to make good these bonds sacrifices the confidence of the people, the absence of which would leave no room for financial activity in the future. This deplorable condition, coupled with a total obligation of \$707,300,000 with a heavy yearly burden of interest and principal, would make it immensely difficult to maintain the present enterprises of communications as they are. It would be next to impossible to extend or to improve them so as to be helpful in the spread of culture, development of industry, and promotion of military affairs and national defense.

There is, however, a ray of hope, for there is a way to work out a plan of financial re-organization for the Ministry of Com-

munications. The plan is twofold: that which is internal, concerning the Ministry itself, and that which is external, lying beyond the control of the Ministry. The internal part consists in a revision of the transportation tariff, postal, telegraph and telephone rates, reduction of the members of the staff, and economy of materials, so that the income can at least meet the expenditure. In case of any surplus, it can be spent on improvement and extension of these enterprises. All these matters, including considerations for the care of property and maintenance of credit and confidence, are within the proper purview of the Ministry, which has already instructed the different offices to carry them out in the most careful way possible. The external part of the plan depends first upon the removal of all the unnecessary obstacles which have obstructed the administrative unity of the Ministry, and secondly, upon the maintenance of an independent system of accounts, which does not permit any borrowing or appropriation of the revenues by any other party. In other words, the independent financial policy of the Ministry of Communications must not be dynamic, but static, and must not be subjected to the handling by any other department. We need not here go into the reasons for this static policy, which are given in a separate memorandum.

For a sound financial re-organization of the Ministry, a general re-adjustment of its internal and foreign loans is most important. The Ministry of Communications has, as stated, a total indebtedness of over \$707,300,000. Of this amount, about \$87,200,000 (representing loans on Kao-Hsu, Chen-Tsi, Mongolian, Ki-Hui, Cheng-yu, Tung-Chen, Shanghai-Hangchow Railways, and Telegraph loans) were originally used by the Ministry of Finance, which should, therefore, be responsible for their repayment. The remainder should be met according to the following ways:

A. Those which can be fully paid with available resources, such as the Peking-Mukden Railway Loan, the Tientsin-Pukow Railway Loan, and the Shanghai-Nanking Railway Loan, amount to a total of about \$319,200,000. They can be, as they have been, regularly paid out of the revenues of these railways (See Table A for details).

B. Those short term loans amounting to a little over \$80,900,000, can be repaid from the surplus of railway and telegraph revenues. (See Table B.)

C. A total of over \$219,900,000 should be turned over to the Commission on Financial Readjustment. A portion of this total relating to loans for railways and telegraph construction the Ministry of Communications will endeavour to meet, while the remainder is entirely beyond its resources (See Table C.)

The Ministry of Communications will undertake to repay the loans of the classes A and B, as it has done in the past, either out of the revenues from the post, telegraph, and railways, or from the surplus after a revision of the rates. It is beyond the resources of the Ministry to do anything for the loans of class C. For the last few years, the advances made to the Ministry of Finance amount to no less than \$180,000,000 in principal alone, without counting interest. It is perhaps unnecessary for this Ministry to recover these advances from the Ministry of Finance directly, but at the same time, it is planned that the loans of class C should be included among those for general readjustment. The Ministry of Finance must have plans of its own to adjust all the unsecured obligations either with the $2\frac{1}{2}$ per cent. tariff increase or any other financial resource as security. How the small loans are to be consolidated and how the short term loans are to be converted into long terms are questions for the Ministry of Finance to decide. As far as the Ministry of Communications is concerned, it craves the sympathy and understanding of the whole country, for much that is to be re-adjusted lies beyond its own power. As a sound financial policy for the Ministry of Communications is a vital problem to China, we hope that the day will soon arrive when an independent system of accounts that the day will soon arrive when an independent system of accounts will become a fact, when responsibilities for the loans are all divided, and when administrative authority will be centralized. When that day comes, there can be a financial re-organization of the Ministry, which will in the end mean a great boon to the future of the enterprises of communication and transportation in China.

We take the pleasure of submitting herewith the reasons and ways for a financial re-organization, which should, with your concurrence, be brought before the Re-organization Conference for consideration and approval.

With enclosures.

(A) Schedule of Obligations with Proper Financial Resources to Redeem the Principal and Interest.

(B) Schedule of Obligations to be Liquidated by Railways and Telegraphs.					
Items	Total	Items	Total	Grand Total	
Railway Obligations on Foreign Loans	\$12,290,766.46	Railway Obligations on Materials	\$34,116,451.10		
Railway Obligations on Domestic Loans	\$7,318,388.84	Telegraph Obligations on Materials	\$ 5,965,817.85		
Railway Obligations on Bonds	\$21,252,843.59			\$80,944,267.84	

(C) Schedule of Obligations to be Liquidated by Financial Readjustment Program.

Name of Loan		Amount of Principal		Amount of Interest		Various Currencies converted into Dollars
		Outstanding at September 30, 1923		Unpaid of Matured Liability September 30, 1923		
Advance for Chu-Ching Railway (American International Corporation)	...	G. \$	250,000.00	\$	309,673.33	\$ 2,919,346.66
Advance for Ching-Men Branch Line	...	£	52,972.11.3			\$ 529,725.63
Advance for Harbin-Heilungchiang Railway	...	Q. Nin	500,000.00	Tls.	127,500.00	\$ 896,428.57
Tientsin-Pukow Railway Original Loan Part of Deutsche Asiatische Bank	...	£	2,650,000.00	£	795,000.00	\$ 34,450,000.00
Tientsin Pukow Railway Supplementary Loan, Part of Deutsche-Asiatische Bank	...	£	1,590,000.00	£	508,800.00	\$ 20,988,000.00
Hukuang Railway Loan, Part of Deutsche-Asiatische Bank	...	£	1,070,000.00	£	346,986.00	\$ 14,169,890.00
Tientsin Pukow Railway Loan, Advance from Deutsche-Asiatische Bank	...	£	900,424.6.4	£	409,593.2.4	\$ 13,100,174.33
Obligations on Materials of Peking Suiyuan Railway, Han-yeh Ping Iron & Steel Works	...	Silver	676,985.65			\$ 967,122.36
Canton Hankow Szechuan Railway Loan	...	£	4,750,000.00			\$ 47,500,000.00
The Yokohama Specie Bank Loan	...	Y.	9,670,000.00	Y.	567,250.00	\$ 10,237,250.00
Advance for Improving and Developing Telegraph Corporation Ltd. Lines from East-Asia Industrial Co.	...	Y.	15,000,000.00	Y.	364,000.00	\$ 15,364,000.00
Telephone Loan	...	Y.	10,000,000.00	Y.	1,930,000.00	\$ 11,930,000.00
Marconi Wireless Telegraph Advance	...	£	200,000.00	£	26,235.14.6	\$ 2,262,357.00
Domestic Short Term Loan	...	\$	9,055,149.32	\$	1,083,013.67	\$ 10,138,162.99
Direct Expenditure of Szechuan Railway	...	\$	8,007,560.57	\$	3,161,025.09	\$ 11,168,585.66
Indirect Expenditure of Szechuan Railway	...	\$	9,145,669.23	\$	4,938,661.38	\$ 14,084,330.61
Hunan Railway Share (Class A) Fixed Bonds	...	\$	27,815.00	\$	6,303.40	\$ 34,118.40
Hunan Railway Share (Class B) Fixed Bonds	...	\$	4,194,550.00	\$	534,959.35	\$ 4,729,509.35
Hunan Railway Loan to Hunan Bank	...	Hunan Tls.	672,400.80			\$ 517,231.36
Kiangsu Railway Share Fixed Bonds	...	\$	312,250.72	\$	102,001.90	\$ 414,252.62
Chekiang Railway Share Fixed Bonds	...	\$	880,542.38	\$	61,637.93	\$ 942,180.31
Chekiang Railway Bonds	...	\$	206,600.00	\$	23,243.20	\$ 229,843.20
Hupei Railway Share (Issued by Hupei Provincial Authorities) Fixed Bonds	...	\$	161,779.71	\$	36,400.44	\$ 198,180.15
Hupei Ry. Share Subscribed by the Hupei Authorities out of the Revenue of Rice Tax	...	\$	589,021.40	\$	26,505.96	\$ 615,527.36
Lo-Tung Railway Share	...	P. Tls.	230,000.00			\$ 328,571.43
Tung-Pu Railway Loan (From Different shops)	...	Tls.	540,050.53			\$ 771,500.75
Tung-Pu Railway Due to Shanghai Executive Office	...	Tls.	97,667.55			\$ 139,525.07
Guarantee Interest of Tung-Pu Railway due to Shanghai Provincial Office	...	Tls.	58,224.45			\$ 83,177.79
Advance for Anhwei Railway from Provincial Executive Office	...	Qua Nin	107,390.45			\$ 153,414.92
Advance for Anhwei Railway from Provincial Executive Office	...	\$	45,219.01			\$ 45,219.01
Amount of Anhwei Railway Due to Contractor Yao Sin-Chi	...	Qua Nin	20,000.00			\$ 28,571.43
		G. \$	1,150,000.00	G. \$	309,673.33	
		£	11,213,396.17.7	£	2,116,614.16.1	
		Y.	34,670,000.00	Y.	2,861,250.00	
		Qua Nin	627,390.45	Qua Nin	127,500.00	
		Silver	676,985.65			\$ 219,936,166.98
		Hu. Tls.	672,400.80			
		P. Tls.	230,000.00			
		Tls.	695,942.53			
		\$	32,626,157.34			

Japan's Super Power System

Toho Electric Power Company, Limited

THE history of the Toho Electric Power Company, Limited, is in many ways typical of the general course of electrical development in Japan. It is the result of the gradual amalgamation, during the last several years, of 33 comparatively small power undertakings.

The business originated from the Nagoya Electric Light Company, Limited, one of the first commercial electric companies in Japan. Organized with a paid-in capital of \$37,500, that company began distributing electricity in Nagoya on December 15, 1889. As the Company grew and prospered it absorbed, from time to time, various other electric companies operating in the so-called "Kansai District" of Central Japan.

While the Nagoya Company was extending its operations in the "Kansai District" the Kyushu Electric Power and Traction Company, organized in 1896 as the Hakata Electric Light Company, was expanding and consolidating numerous small utility companies in the so-called "Kyushu District" which covers a large part of the island of Kyushu in southern Japan.

Early in 1922 these two concerns were merged. Shortly after this important amalgamation the consolidated company changed its name (June, 1922) to the Toho Electric Power Company, Limited. The Company is, next to the Tokyo Electric Light Company, Limited, the largest retail distributor of electric energy in Japan.

Directly, or through subsidiaries, it supplies practically without competition electric light and power to more than 4,000,000 people in a territory of approximately 4,000 square miles.

The Company also does some artificial gas and electric railway business, deriving about 7 per cent. of its gross earnings from these and other miscellaneous operating activities.

Operations are mainly conducted in two distinctly separate business areas, the Kansai manufacturing district in and around Nagoya, Gifu, Nara and Toyohashi in central Japan and the industrially important Kyushu district in and around Fukuoka and Nagasaki in southern Japan. In these densely populated districts, the Company serves 1,489 factories. More than sixty cities with a population in excess of 10,000 each are supplied exclusively by the properties of the Toho system.

More than 20,000 stockholders own the \$51,102,112 outstanding capital stock, which is now quoted in Tokyo at a substantial premium.

Total bonds and stocks presently to be outstanding amount to more than \$89,000,000.

Territory Served

Nagoya, one of the most important cities of the Kansai district, has an estimated population of 600,000 and ranks as the fifth largest city in Japan.

It is an important manufacturing center. Its diversified industries include cotton spinning mills, porcelain and China factories, clock and watch factories, cement mills, steel mills and machine shops. Other important cities served in this densely populated section are Gifu, Yokkaichi, Toyohashi and Nara. Gifu is well known for its manufactured products, which include lanterns, fans, parasols, silk crepe and the remarkably tough Mino paper that is much used in building construction. Yokkaichi is an important port on Ise Bay.

Nara is one of the oldest cities in Japan. Its history dates back to the year 710. For a time it was the capital of the Empire. It has long been known as the center of Japanese art and culture.

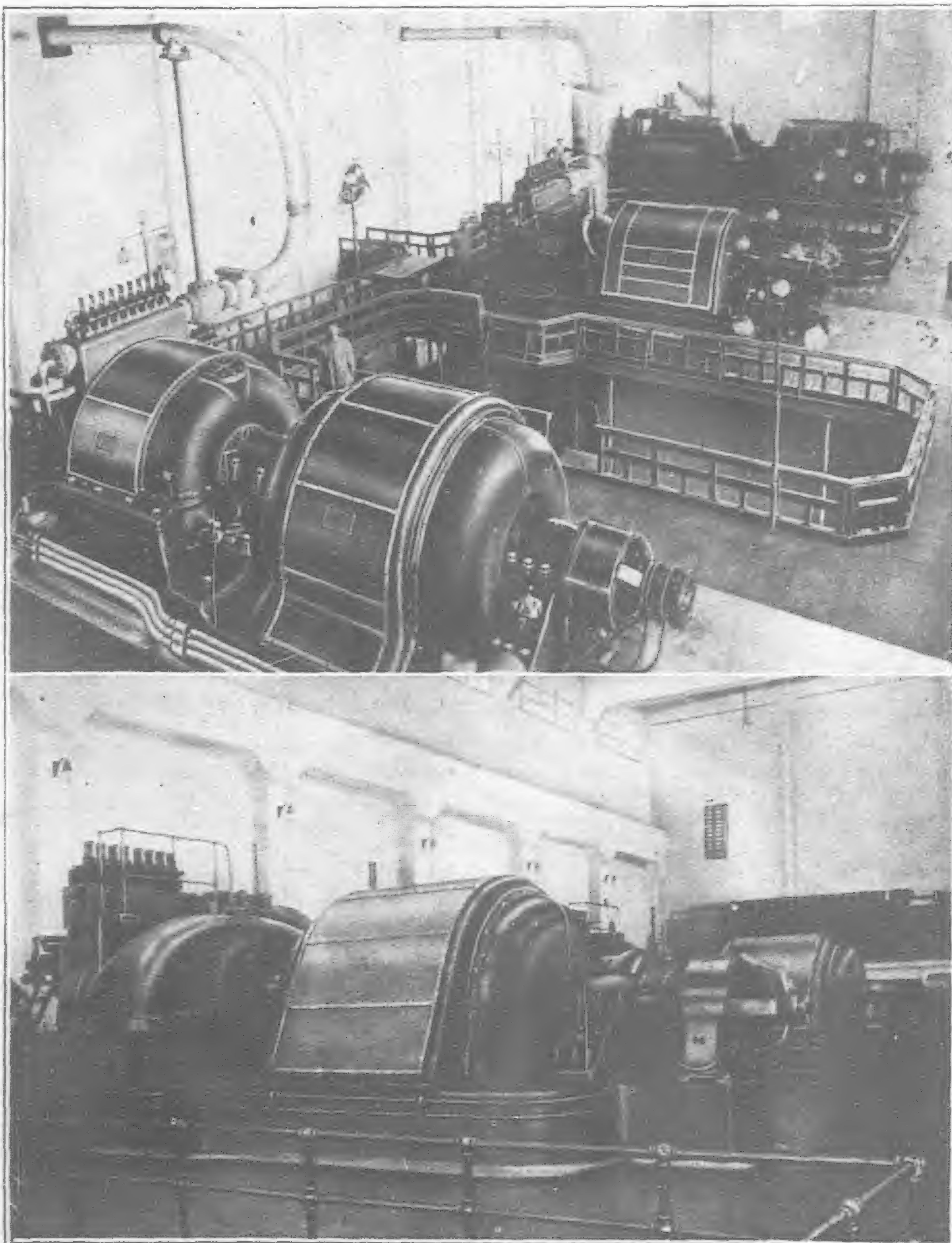
The Kyushu district served by the Toho system embraces that part of the Island of the Kyushu extending from Nagasaki, the principal commercial port of southern Japan, along the western coast through the heart of the Fukuoka mining district up to Shimonoseki, the important gateway to Chosen.

Fukuoka, the center of the Company's activities in this district, is the largest prefecture of Kyushu. It is the mining center of the Island.

The great industrial plants and rapidly increasing population of the territory served by the Toho system afford an ever increasing diversified market for electric light and power.

Growth

During the last four years, the quantity of electric energy sold by the properties of the Toho system has more than doubled.

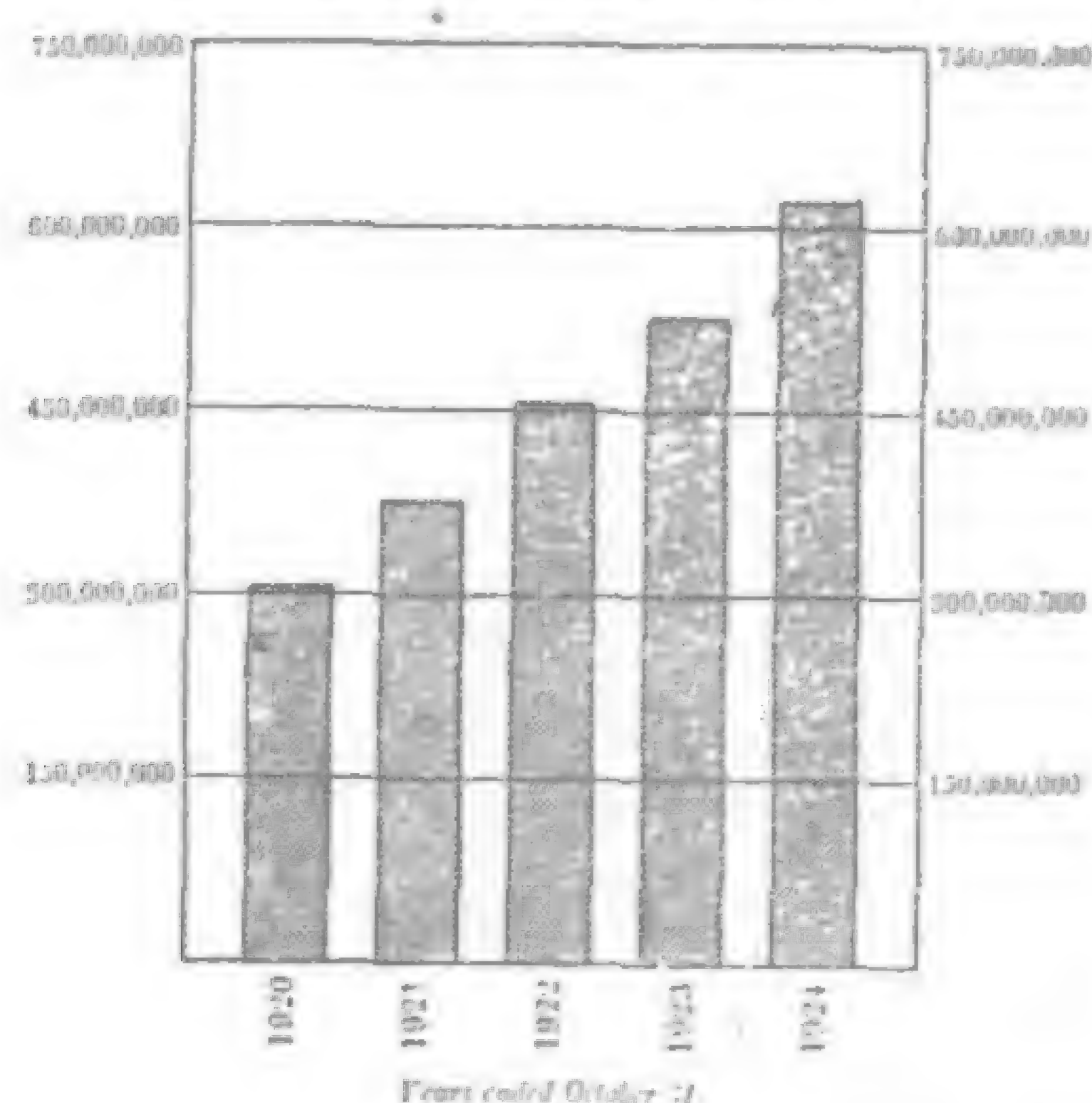


Toho Steam Generating Stations. Above, Atsuta; below, Nashima

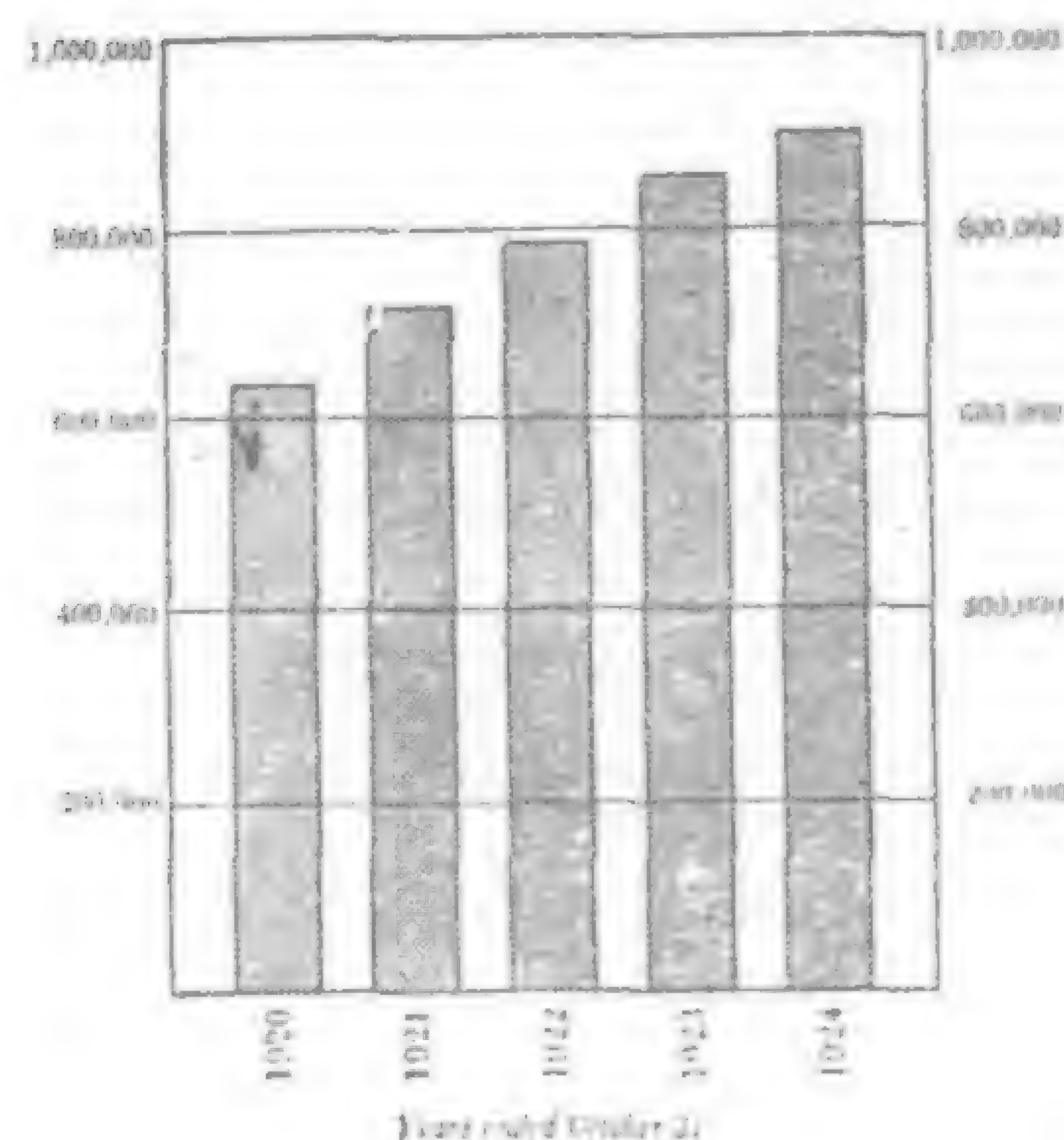
Kilowatt-hour sales to lighting customers have increased approximately 95 per cent. since 1920. This remarkable increase has even been exceeded by sales to poor consumers, which have increased more than 110 per cent. during the same period.

The consistent increase in total sales by properties now constituting the system and the number of customers served is graphically illustrated in the following charts:

Electric Sales in Kilowatt Hours



Number of Electric Customers



More than 90 per cent. of the total number of households in the districts served are now customers of the Company.

The diversity of market provided by nearly 900,000 customers minimizes load fluctuations and tends to insure a continuity of steady demand.

Per capita consumption is still low and a considerable amount of new business awaits the installation of additional generating and distributing facilities.



Hichiso Hydro-Electric Station on the Hida River



Shimoaso Power Plant Site, Hida River

New Generating Stations

In the Kansai district of central Japan, suitable sites for hydro-electric development abound. As might therefore be expected, the greater portion of the energy distributed by the Toho company in this territory is generated in water-plants. Owing to the fact, however, that there is in most cases a considerable variation in the amount of water available for power production, maintenance of adequate service in the Kansai district is better assured by supplementing hydro-electric plants with steam stations.

The 35,000 kw. initial installation in the new Nagoya steam station should be in regular operating service before November 1, 1925. It will assist in caring for possible power shortages during the low

water season and provide reserve capacity for peak-load demands. On the island of Kyushu where Japan's main steel and iron district are located, hydro-electric sites are relatively scarce. The chief coal deposits, however, are found in this island and in consequence steam stations play a more important part there than in the rest of Japan.

Including the additional 20,000 kw. now being installed in the Nashima steam plant, approximately 83 per cent. of Toho's generating capacity in the Kyushu districts is installed in steam stations, located in the center of the coal mining district. The Company's properties now owned or under construction include electric generating stations with a total installed capacity of 147,563 k.w., of which approximately 30 per cent. are hydro-electric. The Company also controls an additional 79,250 kw. under favorable contracts, principally with closely affiliated companies. Other property owned or under construction includes sub-stations with a total capacity of 294,352 kva. and more than 8,200 miles of transmission and distribution lines. All of the properties have been maintained in first class operating condition.

As is usual with Japanese electric distributing companies, the Company also often owns fixtures and appliances used by its customers in somewhat the same way as telephones are owned by the telephone companies in the United States.



Yaodzu Hydro-Electric Power Station



Nashima Steam Power Station

electric companies. The contract with the Great Consolidated (Daido) Electric Power Company, Limited, the largest of such companies, provides that Toho Electric Power Company, Limited, is entitled to receive power in preference to all other companies operating in its territory until 1948 and is subject to renewal thereafter.

Japan is a long and narrow country with a backbone of high mountains, a plentiful rainfall, numerous lakes, and many rivers falling rapidly to an extensive coast line. Its abundant water-powers are therefore capable of economical exploitation.

Hydro-electric stations of the Toho company have a present installed capacity of approximately 50,000 kw. In addition to its already developed water-power concessions, the Toho system controls valuable undeveloped water powers capable of developing an additional capacity of more than 138,000 kw.

Financial

The rapid and consistent increase in the



Nagoya's Well Lighted Thoroughfares

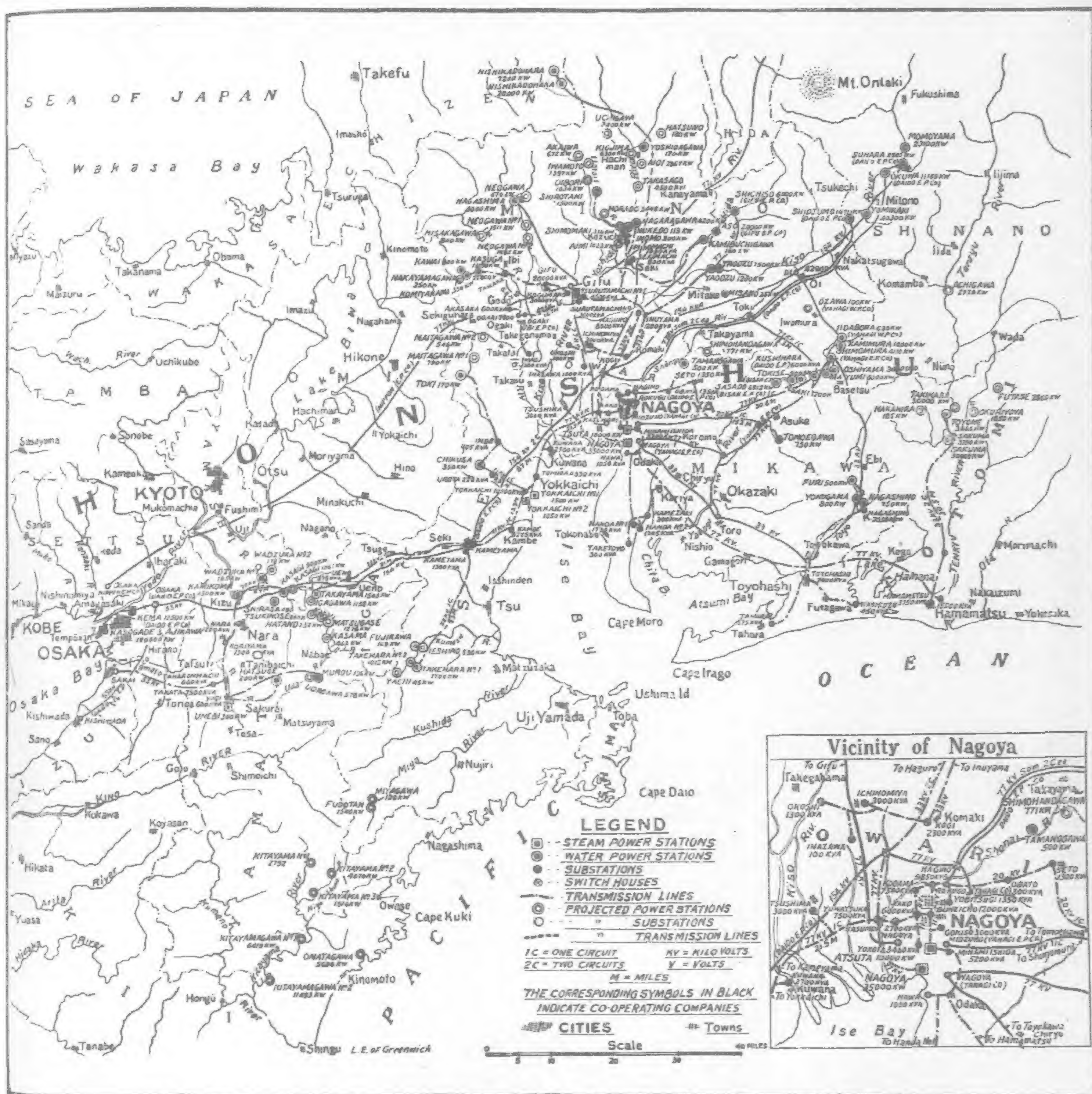
The present depreciated value of the physical properties of the Company, including the new Nagoya steam electric generating station now being built, has been estimated by independent engineers to exceed \$47,000,000.

The Company also has investments, with a present indicated market value of approximately \$17,900,000, in seventeen other utility companies, many of which are operated under the supervision of the Toho company. These affiliated companies comprise eight electric generating and distributing companies, three street railway companies, four electric apparatus manufacturing companies one gas and electric company and one artificial gas company—The Toho Gas Company—which represents the largest single investment in this group of companies. Through this modern and successful coal-gas property the Toho company controls the entire gas business in Nagoya.

Another substantial investment consists of stock of the Great Consolidated (Daido) Electric Power Company, Ltd. About half of the energy distributed by the Toho company is purchased under renewable contracts with, and upon favorable terms from, nine neighboring hydro-



Nashima Steam Station showing Extension for new 20,000 k.w. unit. Photographed November, 1924



Map Showing System of the Toho Electric Power Co., Ltd., in the Kansai District, February, 1925

gross operating earning of the properties now constituting the Toho system is indicated by the following figures:

12 Months ended	Gross Operating Earnings	Operating Expenses, Maintenance, Taxes and Depreciation	Gross Income (including Other Income) Available for Interest
October 31 1921*	\$9,223,695	\$6,745,059	\$4,958,725
1922**	10,375,384	6,970,067	5,455,439
1923	13,267,779	8,577,003	6,376,850
1924	14,654,383	9,645,512	7,174,839

*12 months ended November 30.

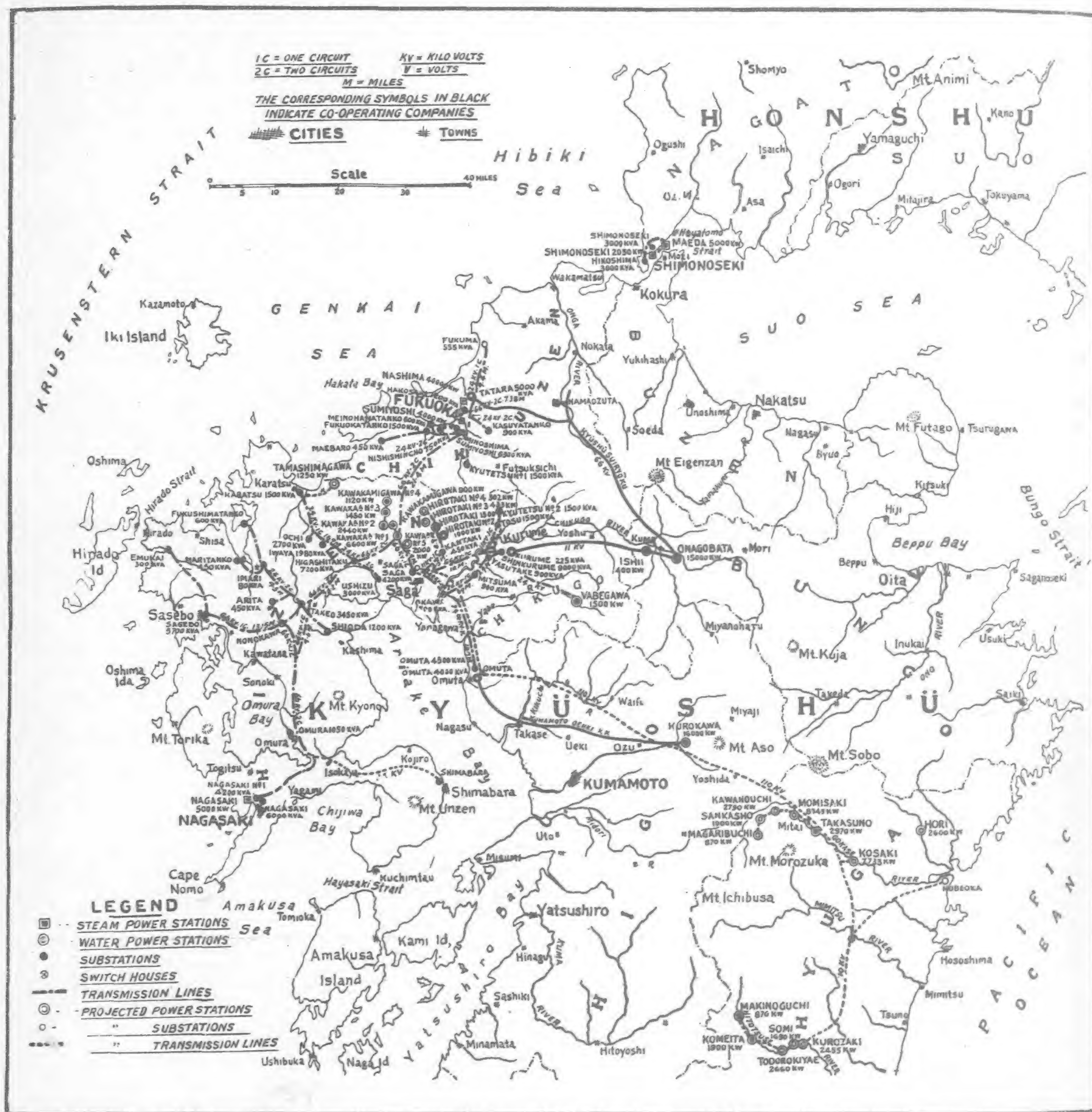
**11 months ended October 31.

The above figures for 1921 and 1922 have been taken from the Company's books and have been approved by the shareholders. The 1923 and 1924 figures shown above have been audited by Messrs. Harold Bell, Taylor & Company, Chartered Accountants of London and Japan.

During the period embraced in the foregoing table operating expenses have decreased from approximately 73 per cent. to less than 66 per cent. of gross operating earnings.

The above financial results have been obtained under the Company's present management. With the experienced counsel of Mr. Momosuke Fukuzawa, Honorary President and Advisor to the Board of Directors, and under the direction, of Mr. Yataro Itami, a member for the House of Peers and President of the Toho company, the active management of the Company's affairs is supervised by Mr. Yasuzaemon Matsunaga, Vice-President and General Manager. Before assuming his present duties in 1922 Mr. Matsunaga served as a managing director of the Kyushu Electric Power & Traction Company. His outstanding success in the management of those properties, which now form a substantial portion of the Toho system placed him among the foremost Japanese utility operators.

Prior to 1925, development of the Toho properties had been entirely financed in Japan, principally through sale of capital stock. Paid-up capital stock increased from \$17,362,700 on November 30, 1918, to \$51,102,112 by October 31, 1924.



Map Showing System of the Toho Electric Power Co., Ltd., in the Kyushu District, February, 1925

New Financing

In March, 1925, there was announced an American offering of \$15,000,000 First Mortgage (Kansai Division) Sinking Fund 7 per cent. Gold Bonds, Series A, maturing on or before March 15, 1955.

Proceeds of these bonds are to be used for the retirement of all outstanding bills payable, for the completion of the Nagoya steam station now under construction and for the purchase and installation of other new plant and equipment.

The Toho company also has recently arranged a twenty-year 5 per cent. sterling loan to the amount of £300,000, to be issued in London and guaranteed by the British Government under the provisions of its Trade Facilities Act.

Remodelling Motor Liner for H.A.L.

Built to the order of the Holland-America Line, for their Dutch East India service, the motor liner *Dinteldijk*, has just sailed from

Belfast at which port for some weeks she has been having additional insulation space fitted as well as a number of other improvements, by Messrs. Harland & Wolff, Ltd.

The vessel, which is classed 100 A.I at Lloyd's is 502 feet long 62-ft. wide, and 39-ft. 6-in. deep, with a gross tonnage of about 9,400. She is equipped with two of the well-known Harland B. W. 8-cylinder motors, which are now in their fourth year of service in this vessel, and running with the greatest regularity and economy. There are four main electrical gearing sets, each of 100 k.w. at 200 volts, driven by three-cylinder Diesel engines, and some 700 lights are installed throughout the vessel in addition to six 2,000 candle power lanterns for illuminating the decks when working cargo. The steering gear, windlass, and 15 winches are all electrically driven. The refrigerating plant has been supplied and installed by Messrs. J. E. Hall, Ltd., of Dartford.

A sister vessel—the *M. V. Drehtdijk*—is also expected at Belfast shortly to have additional insulation space and refrigerating machinery provided and to receive a general overhaul.

International Trade in Cement

By Reigart M. Santmyers

FOR centuries the major part of the structures in China (private homes as well as public buildings, bridges, etc.) have been constructed of brick and stone, as timber is scarce and, as a general rule, more expensive and less durable than any other material. Ordinary lime mortar (lime and sand with water) has been in use for binding these materials.

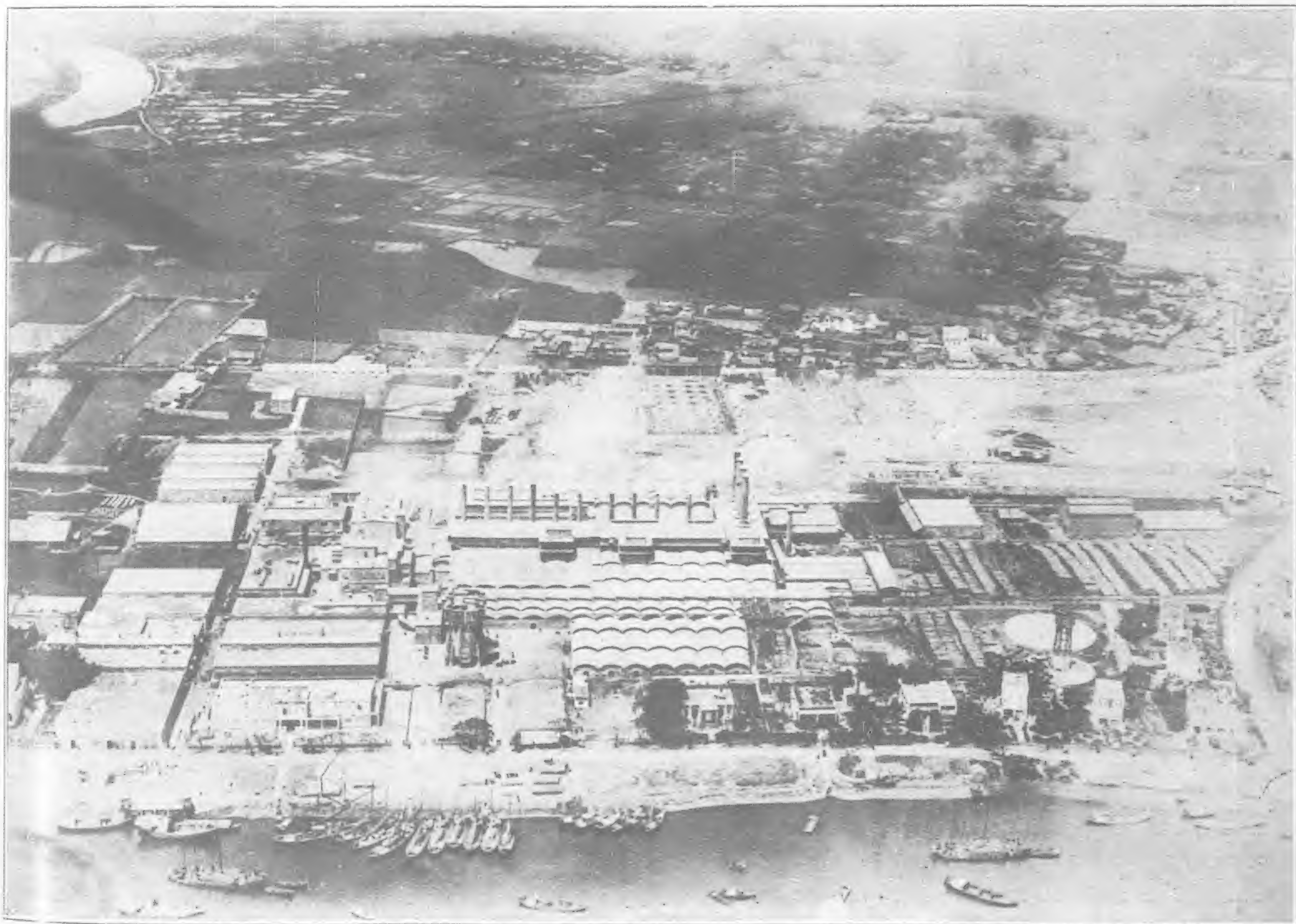
Within recent years modern Portland cement has become available in large quantities and is being quite generally used in the treaty port cities of China (those opened to foreigners for residence and trade) in the building projects of Chinese as well as foreigners. It is also being used by railroads in their bridge work and is being distributed more and more for use by the natives in the interior cities.

At the present time the amount of cement produced is not sufficient to supply the demand, and importations are being made from Japan and from French Indo-China. Consideration has even been given to the question of bringing in cement from the recently constructed plant at Singapore, whereas formerly considerable cement was exported to the Dutch East Indies and [the Straits Settlements.

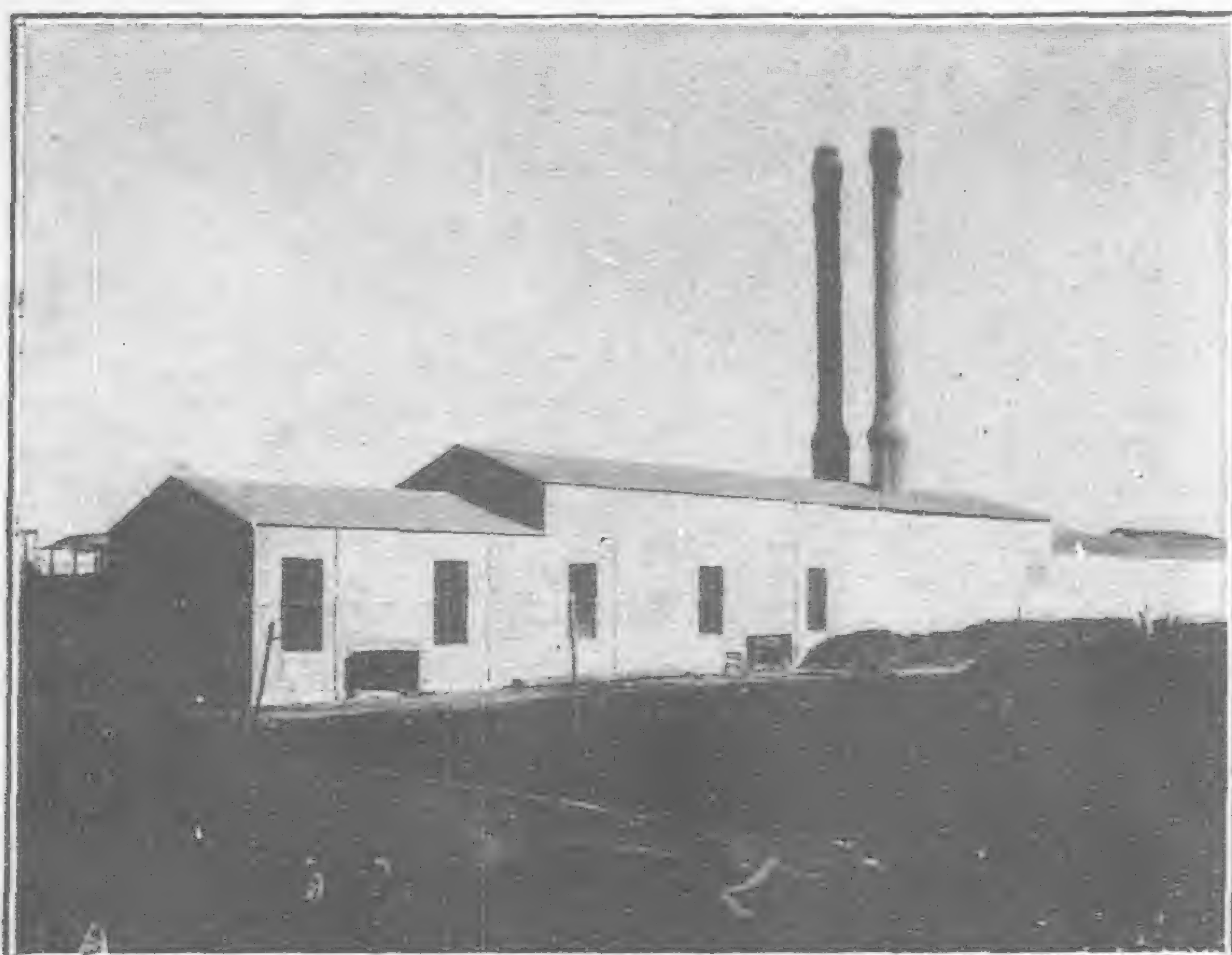
With the development of China along occidental lines, there is increased construction of the Western type of residences, large office buildings, and hotels in the cities where foreigners reside. Many new industrial plants have also been constructed and others of modern type are being projected. There has been a very re-

markable increase within the last few years in the desire to modernize the larger Chinese cities by tearing down the walls of buildings and constructing wide modern streets on the sites, built so that they will bear automobile traffic. Cement is used to a considerable extent in this work. Port development projects are already under way and new ones are planned. New railroad construction is now going on, and with the impetus already given industrial development in China other new railway lines and industrial plants of various kinds will be under construction within a few years. This means an increasing demand for cement, and even to-day the Chinese supply is much below the normal demand.

It would seem that there is a remunerative field in China for one or more large modern cement plants in addition to those already in operation. The first requirement for such a plant—that is, a cheap supply of suitable coal—is, however, not available at present. There is an abundance of coal in China, but the deposits have not been extensively developed. The yearly output of coal in China at present is about 20,000,000 tons, of which 5,000,000 to 10,000,000 tons are produced by primitive native methods. This does not supply the present demand for household and industrial use, and consequently the price is high, ranging from \$7 to \$24 Mexican per ton, and the demand is steadily increasing. Under normal conditions such prices are prohibitive for cement making and the existing plants can operate profitably only on account of the prevailing high price of cement—\$6.30 to \$7.40 Mexican per barrel in Shanghai.



Aeroplane View of the Haiphong Cement Works in Indo-China



Exterior View of Plant at Lunghua

In considering the erection of a cement plant in China the first step should be an investigation of the supply of raw materials. Available areas of suitable coal can be found, but a modern mine would have to be developed. This coal mine would have a market for its output in the demand from the cement plant associated with the mine and the normal open-market demand. Limestone and clay, strategically situated with reference to the fuel supply, could be located, and a cement plant could be erected in a situation where it should prove successful.

At the present time there are six Portland cement plants operating in China. These are located at Tonshan, Province of Chihli; Tayeh, Province of Hupeh; Tsankan, near Tsingtao, Province of Shantung; Canton, Province of Kwangtung; Kowloon, Hongkong leased territory; and at Macao. The estimated daily capacity, in barrels of 375 pounds, of the cement plants which, have been described, is as follows:

	Barrels.
Tongshan	3,000
Tayeh	1,200
Shantung	300
Kwangtung	500
Macao (Green Island)	350
Hongkong	2,000
Total	7,350

This gives a total annual productive capacity, for all plants of 2,682,750 barrels.

Cement in China is packed in barrels with a net weight of 375 pounds or in sacks of 185 pounds. In some cases a rebate of \$0.60 Mexican is allowed for the return of the barrel and \$0.15 for the return of the sack. Prices are made at Shanghai, for this city is the central point to which Far Eastern cements are brought by water and meet in competition on equal terms. None of the above plants carries large stocks, and delivery of a 5,000-barrel order would have to be spread over a period of five to six months.

A cement plant, to cost \$5,000,000 United State currency, is said to be projected for the Philippine Islands and some of the product may eventually find its way into the Chinese market. There is a modern plant owned by Chinese in operation at Singapore. Cement from this plant has not entered the Chinese market in quantity, but the possibility of putting it on this market in competition with other cements is under consideration.

The imports of cement into China from the United States have always been negligible in quantity as a result both of the greater cost of production and the expense of transportation. Owing to the high cost of shipment from abroad and also the lower

cost of production in China, the tendency has been more and more to supply the demand by local manufacture rather than by import from foreign countries.

China Cement Manufacturing Co.—The following was taken from a Japanese newspaper and relates to the erection of a new plant for the manufacture of cement in the Yangtse Valley in China:

"The greatest demand for cement in China occurs in Shanghai, with Nanking in second place. These two cities are connected by both river and railroad. The transport of commodities produced in one to the markets of the other is quick and cheap, and as the greatest market possibilities exist in the Yangtse Valley it is the logical field of cement production. There are no plants now working in this district, but the China Cement Manufacturing Co. has almost completed its plant at Chuyung, a small village 34 kilometers from the city of Nanking, and expects to begin operations this year. The capital of the company, which will have its head offices at Shanghai, is 500,000 taels, equivalent approximately to \$380,000 American currency. The works are being built at Tiger Hill, which is about a mile from the Shanghai Nanking Railway at Lungtan. A spur slightly over one mile in length has been constructed between Tiger Hill and Lungtan. The daily output of the works is estimated at 400 barrels of 375 pounds each.

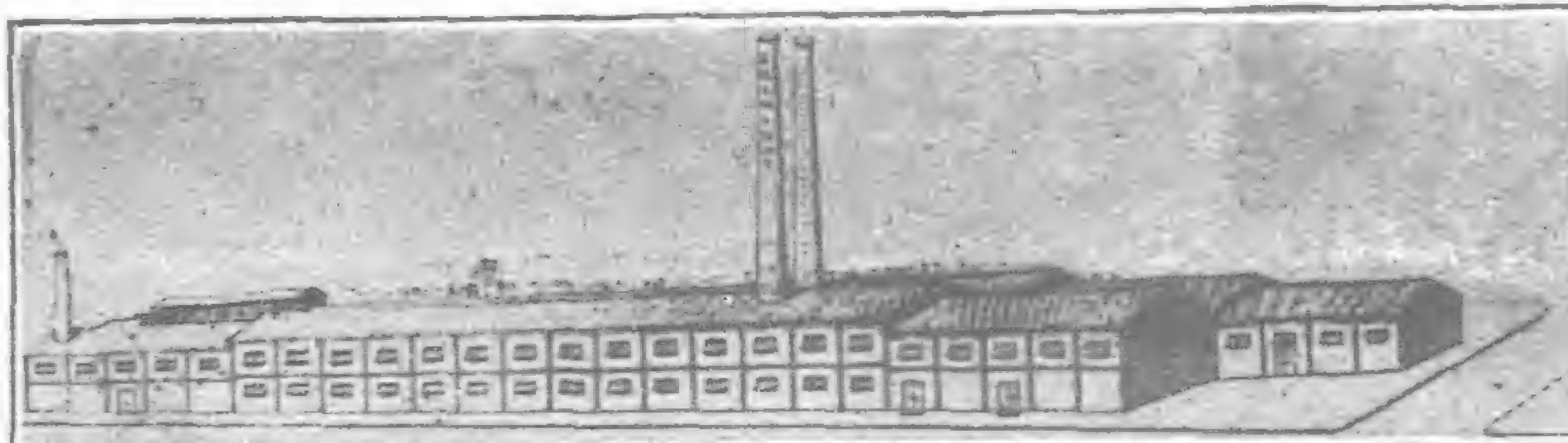
"Unless the demand for cement increases more rapidly than it has during the past several years, the erection of the plant of the China Cement Manufacturing Co., the contemplated enlargement of the existing plants in other districts, and the completion of a new Shanghai plant, which has been started, will tend to greatly reduce the amount of imports from foreign countries and will probably lower the price of cement in all Chinese markets, where, owing to the increased demand, the tendency has been toward a steady advance during the past several years."

Shanghai Portland Cement Co.—The following statement was taken from THE FAR EASTERN REVIEW OF April, 1923:

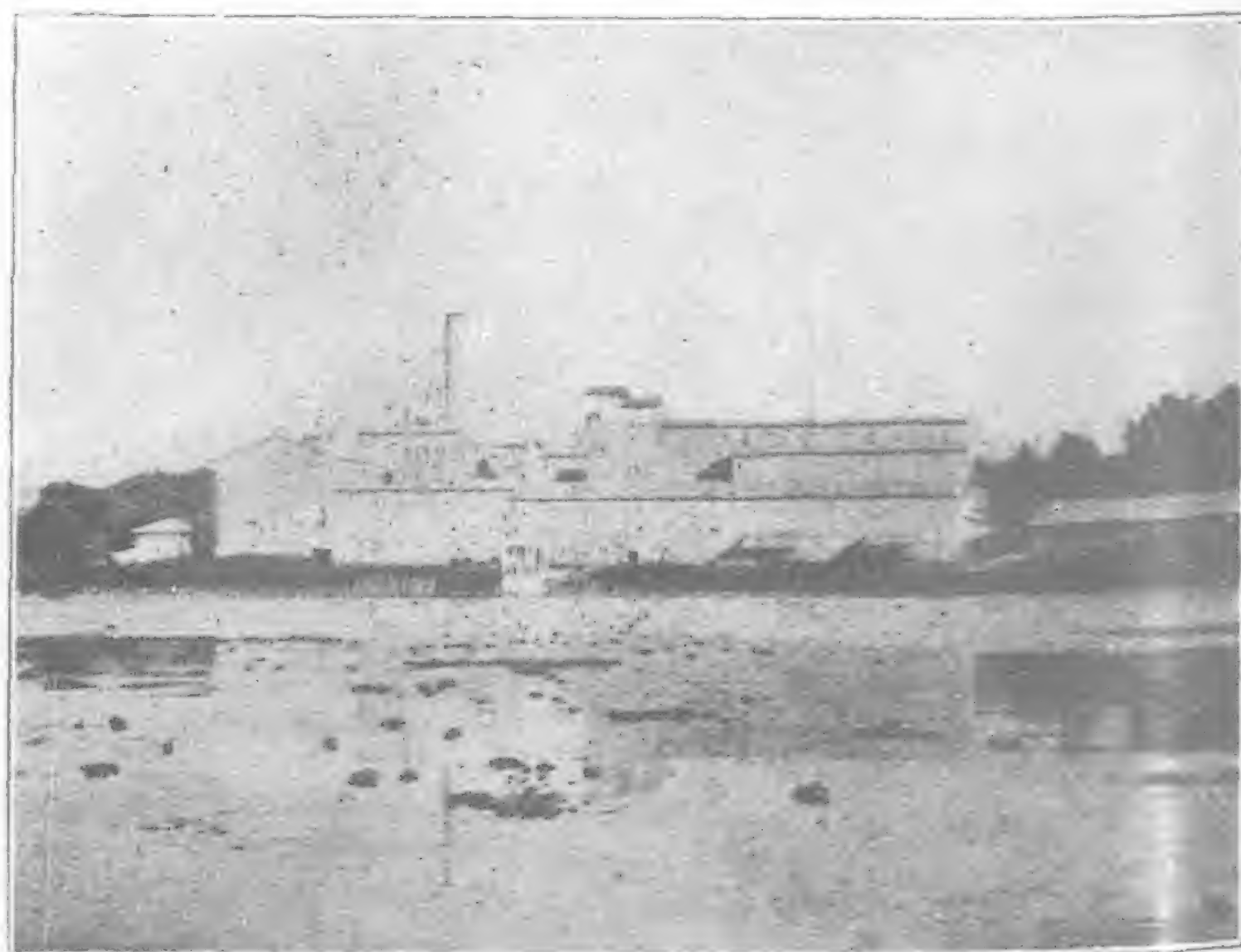
"The Shanghai Portland Cement Co., was organized by the well-known Shanghai merchant, Mr. Liu Hong-son, a number of years ago. Mr. Pao Li-liu, the general manager of the company, traveled extensively throughout America and Europe and finally

placed the order for the machinery with the Perruseus Engineering Works in Germany at a cost of over one-half million dollars. The total capacity of the plant is 1,200 barrels per day. The works are situated one mile from Lunghua and cover an area of about 100 mow (six mow equal to one acre) facing the Soochow Creek on one side and the Whangpoo River on the other.

"The plan for main mill and power plant was designed by E. J. Muller, consulting engineer of Shanghai. The payment for the machinery was handled through the China Siemens Co. Con-



Main Mill Building for the Ta Hu Cement Works



Rizal Cement Plant in the Philippines, Closed Down

struction work was started last spring and is expected to be in operation by the late autumn of this year."

China Portland Cement Co. (Ltd.).—

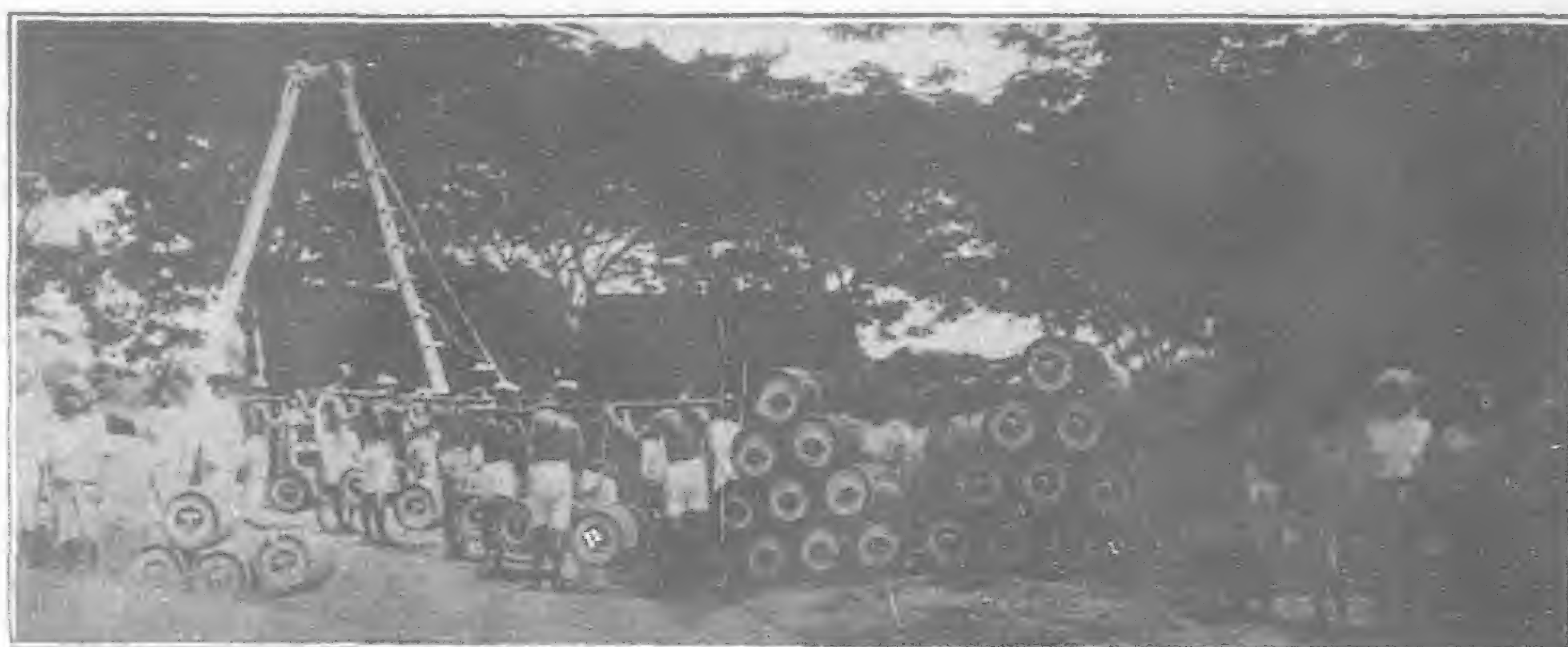
This company was founded in the spring of 1921. The promotor is Mr. Yao Sing-kee, now managing director. Several sites were considered, but the present location at Lung Tan, with an abundance of raw material in the immediate neighborhood, was selected as the ideal one. The limestone in this locality is of very pure quality. The rocks are covered with thick layers of clay. Chemical tests showed that the combination of these two materials in a certain proportion produce a Portland cement of the very best quality. Some hundred yards away are coal mines which supply very cheap coal for the power station, but as it contains too much sulphur and ashes it can not be used in the kilns for manufacturing cement. The transportation of the raw materials is very economical, the deposits being higher than the factory and conveyed to it by gravity.

Imports

The importation of cement into China for the years 1911 to 1914 averaged 93,219,000 pounds, valued at \$485,660. Of this amount Hongkong and Japan shipped in about equal proportions—34,931,000 pounds, or 37 per cent., from Hongkong and 34,926,000 pounds, or 37 per cent., from Japan. Hongkong's exports of cement to China were valued at \$172,612, or 36 per cent of the total imports, while Japan's was valued at \$170,564, or 35 per cent. The United States played only a very minor part in supplying the cement needs of China, shipping in during this same period an average of about 4,000 pounds, or 4 per cent., valued at \$79.

In the post-war years 1919 and 1920 Japan increased its exports to China by 403 and 261 per cent., respectively. Its shipments for the first year amounted to 140,799,000 pounds or 69 per cent. of the total cement imports of China (203,047,000 pounds), while in 1920 its exports dropped to 91,225,000 pounds, or 39 per cent. of the total. Hongkong in these two years sold China cement to the amount of 20,113,000 pounds and 33,667,000 pounds, or 10 and 14 per cent. of the respective total imports of cement.

During 1921 and 1922 Japan again increased its exports to China, the shipments for these years being 129,630,000 pounds, or 38 per cent. of the total of 337,771,000 pounds, and 154,971,000 pounds, or 37 per cent. of a total of 423,734,000 pounds. Hong-



Native Staff of Siam Cement Works

kong increased its exports to China of cement by 179 and 261 per cent., respectively, over exports of the period 1911-1914. For the first of these two years Hongkong exported 62,674,000 pounds, or 19 per cent. of a total import of 337,771,000 pounds of cement into China, while in 1922 she exported 91,331,000 pounds, or 22 per cent. of the total.

The United States steadily increased its exports of cement to China during the years 1919 to 1921. In 1919 it exported 34,000 pounds, or 0.02 per cent; in 1920, 318,000 pounds, or 1 per cent. in 1921, 526,000 pounds, or 2 per cent; and in 1922, 438,000 pounds or 1 per cent of the total importation of cement into China.

VALUE OF IMPORTS OF CEMENT INTO CHINA, 1911-1914

					Average.
Imported from—	1911	1912	1913	1914	1911-1914
Hongkong	\$241,127	\$148,822	\$96,561	\$203,937	\$172,612
Macao	28,397	11,075	17,996	26,069	20,884
Indo-China, French	44,962	41,371	57,867	49,537	48,434
Straits Settlements ...	55	37	—	141	58
British India... ..	—	51	83	16	37
United Kingdom ...	2,629	571	1,371	974	1,386
Sewden	—	160	—	—	40
Denmark	—	775	962	—	434
Germany	4,523	20,106	23,811	13,436	15,469
Netherlands	12	455	—	—	117
Belgium	1,342	2,809	977	3,397	2,131
Austria-Hungary ...	—	—	—	1,715	429
Russia	13,690	18,719	54,527	107,240	48,544
Chosen	16,281	49	105	28	4,116
Japan... ..	197,759	87,346	195,235	201,967	170,564
Philippine Islands ...	—	—	284	178	115
United States, Hawaii	—	26	108	182	79
All other countries ...	722	64	51	—	211
Total	551,499	332,385	449,938	608,817	485,660
Average price per 100 pounds	0.53	0.51	0.54	0.51	0.52

Source : Returns of trade and trade reports of China.

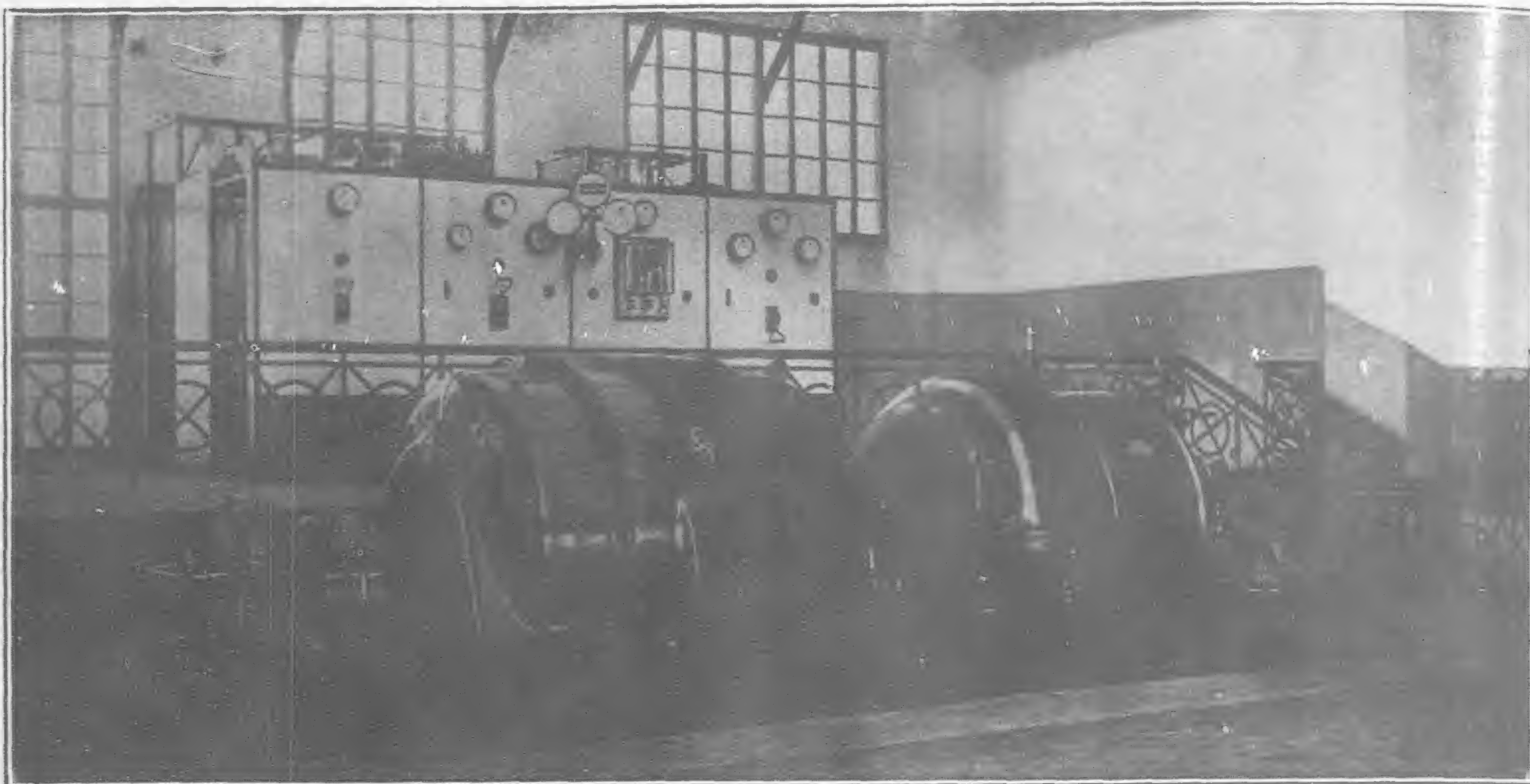


Kiln House with Travelling Crane



Electric Rotary Kiln

Humboldt Machinery in the Ta Hu Cement Works



Shanghai Portland Cement Works Power Plant, 2,000 H.P., M.A.N. Turbine Coupled to 1,440 K.W. 50 Cycles, 525 Volts Siemens Generator

IMPORTS OF CEMENT INTO CHINA BY QUANTITY, 1919-1922
(Quantities in thousands of pounds)

Imported from—	Average, 1911-1914	1919	1920	1921	1922
Hongkong ...	34,931	20,113	33,667	62,674	91,331
Macao ...	4,275	20,149	33,106	45,985	38,815
French Indo-China ...	8,539	14,618	42,993	56,291	83,641
Straits Settlements ...	16	—	2	88	1,187
British India ...	1	2	58	73	3
United Kingdom ...	142	145	101	31	238
Sweden ...	10	—	2	—	190
Denmark ...	98	—	—	100	1,498
Germany ...	3,251	—	—	34	1,236
Netherlands ...	27	—	—	—	—
Belgium ...	449	—	—	3	167
Austria and Hungary	94	—	3,732	—	—
Russia ...	5,599	6,518	1,130	220	983
Chosen ...	823	669	29,454	35,933	10,840
Japan... ..	34,926	40,799	91,225	129,630	154,971
Philippine Islands ...	18	—	—	4	33
United States, Hawaii	4	34	318	526	438
All other countries ...	16	—	1,062	6,280	38,163
Total	93,219	203,047	236,850	337,771	423,734

Source: Returns of trade and trade reports of China.

Philippine Islands

Extensive use of cement in the Philippine Islands and its excellent adaptation to construction in the Tropics, originally suggested the erection of a plant in the locality of Manila, and after investigation and the discovery of natural local resources of raw materials the Rizal Cement Co., was organized in December, 1911. Factory equipment was secured from Europe, and the first cement was manufactured and placed on the market in July, 1915. The plant produced annually about 313,000 barrels, the importation of foreign cement declining greatly. In the second year of production only 100,000 barrels was turned out, and in 1918, When the company was forced to liquidate, it produced only some 50,000 barrels.

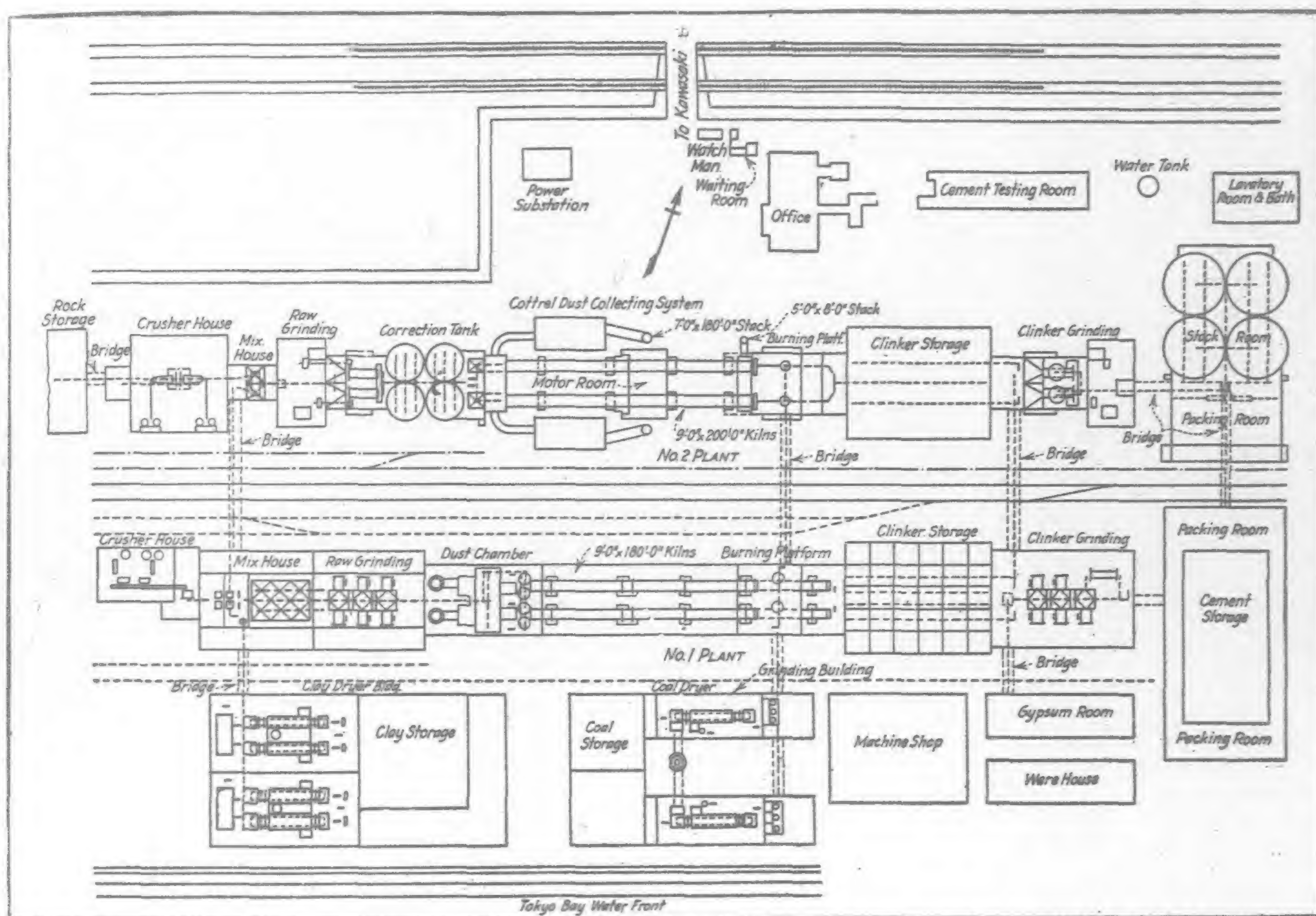
A bill authorizing the organization of a national cement company with a capital of 500,000 pesos was placed before the Philippine Legislature in February, 1919, and was passed with little or no opposition in March of the same year. Nothing further has yet been accomplished, but it is expected that as soon as the National Coal Co., reaches the stage where it will be capable of supplying a large cement plant the Government will take definite action.

Imports

The imports of cement into the Philippine Islands averaged 144,993,000 pounds, valued at \$626,740, in the four pre-war years 1911-1914. Of this amount Hongkong exported 64,543,000 pounds



General View of the Kawasaki Plant of the Asano Cement Company



General Layout of Plants Nos. 1 and 2 of the Asano Cement Co. at Kawasaki

valued at \$252,079, or 45 per cent. of the quantity and 40 per cent. of the value of the total import of cement.

Germany during this period exported an average of 34,450,000 pounds, valued at \$167,749, or 24 per cent. of the quantity and 27 per cent. of the value. The United States averaged some 3,842,000 pounds of cement during this period or about 3 per cent. of the quantity and 4 per cent. of the value of the total imports of cement into the islands.

In 1919 the imports of cement were about 76 per cent. of those of the four pre-war years, or 110,604,000 pounds. Japan furnished some 43,073,000 pounds during this year, or 39 per cent. of the total imports. The French East Indies was next, furnishing 38,766,000 pounds, or 35 per cent. The United States exported only some 78,000 pounds—a small very proportion

when compared with the total.

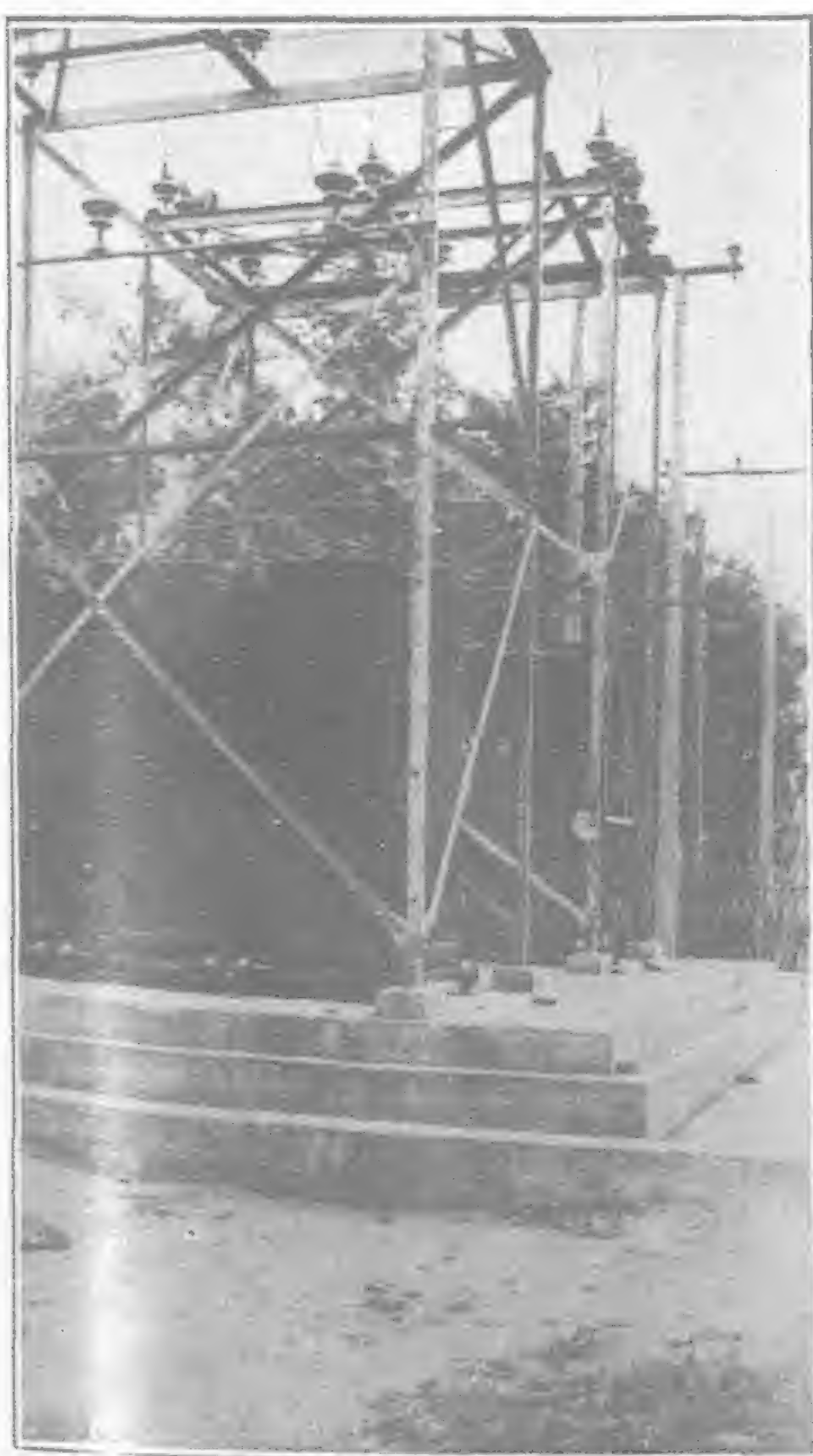
The Philippine Islands imported more cement during 1920 than in any other year covered by this report, the imports being about 31 per cent. higher than the average for the pre-war years. Of a total of 189,554,000 pounds of cement imported Japan furnished 137,575,000 pounds, or 73 per cent., while the United States exported some 10,554,000 pounds, or 6 per cent. of the total.

In 1921 the importations of cement into the islands fell to 109,119,000 pounds, or about 75 per cent. of the average imports during the years 1911 to 1914. Of this amount Japan exported 65,819,000 pounds, or 60 per cent. of the total import. The United States exported 4,609,000 pounds, or 4 per cent.

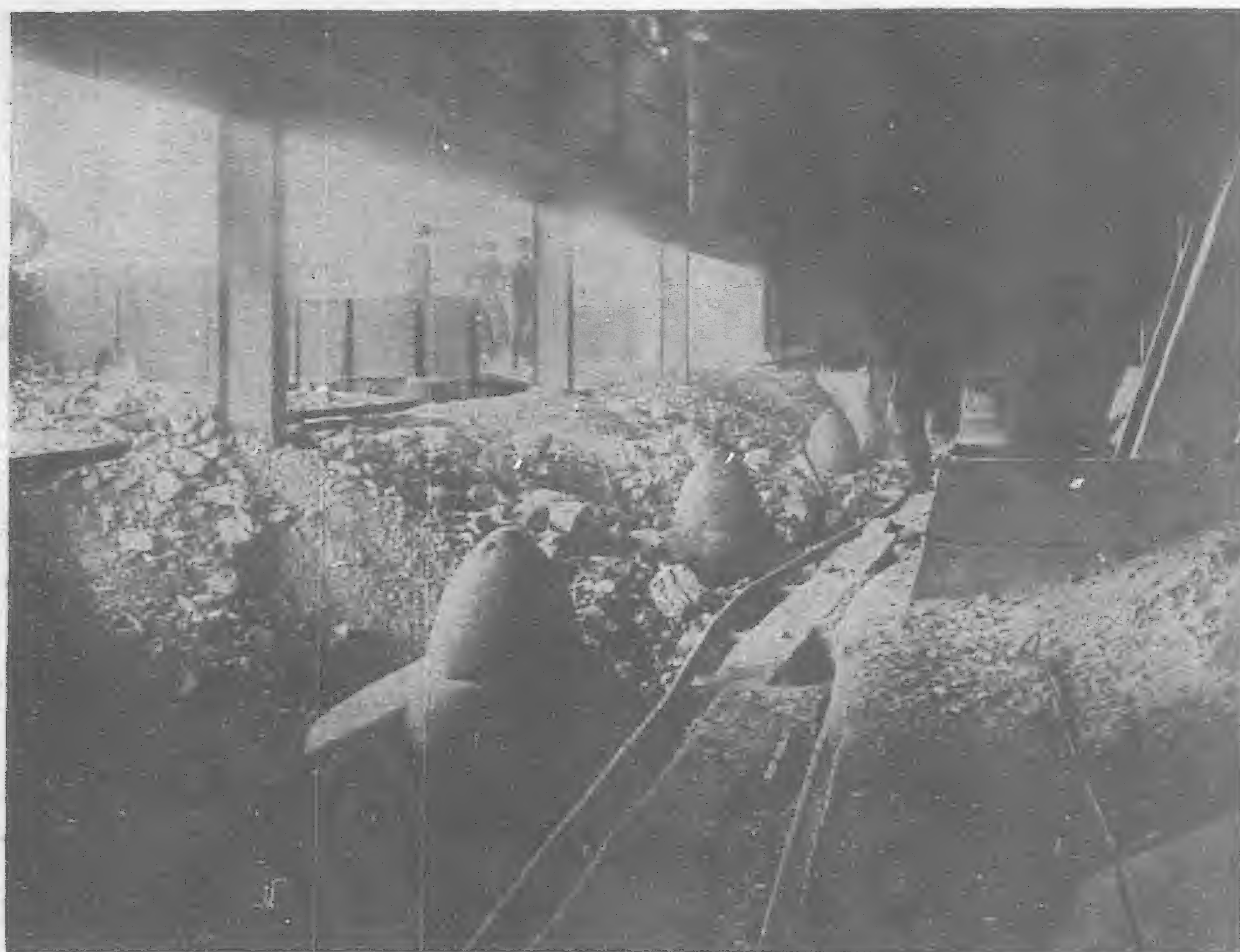
The importations of cement into the Philippine Islands for the year 1922 amounted to some 115,354,000 pounds, or 80 per cent. of the average imported in the four pre-war years from 1911 to 1914. Of this amount Japan exported 63,804,000 pounds, or 55 per cent. of the total importation, while the French East Indies, with 29,666,000 pounds, or 26 per cent. was next in the quantity furnished to the islands. The United States exported some 2,726,000 pounds or 2 per cent. of the imports.

VALUE OF IMPORTS OF CEMENT INTO THE PHILIPPINE ISLANDS

					Average,
Imported from —	1911	1912	1913	1914	1911-1914
United Kingdom	\$7,840	\$1,906	\$220	—	\$2,986
Germany	16,432	80,271	416,844	\$157,451	167,749
France	114	181	850	308	363
Austria-Hungary	67	—	—	—	16
Belgium	2,148	1,651	4,605	761	2,291
Russia	1,020	824	—	—	461
China	2,725	124	50,108	99,775	38,183
Hongkong	352,177	329,609	199,790	126,739	252,079
Japan	6,384	6,089	48,806	121,351	45,660
British East Indies	19	—	1,277	—	324
French East Indies	117,761	118,403	87,068	43,431	91,666
Spain	—	213	193	—	102



Complete Station Showing 30,000 Volt Transmission Tower at the Chee Hsin Cement Works



Allis-Chalmers Gyratory Crushers at the Kawasaki Plant

VALUE OF IMPORTS OF CEMENT INTO THE PHILIPPINE ISLANDS

Imported from—	1911	1912	1913	1914	Average, 1911-1914
United States ...	91,979	468	36	119	23,150
All other countries	—	—	1,895	4,947	1,710
Total ...	598,666	539,749	811,692	554,882	626,740

Average price per 100 pounds44	.37	.48	.43	.43
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Source: Annual Report of the Insular Collector of Customs, Philippine Islands. Import values in the Philippine statistics represent foreign values; that is, actual market values or wholesale prices of imported merchandise, as bought and sold in the usual wholesale quantities at the time of exportation to the Philippine Islands in the principal markets of the country whence imported, and in the condition in which such merchandise is bought and sold for exportation to the islands or consigned to the islands for sale included the value of all cartons, cases, and coverings of any kind and all other costs, charges, and expenses incident to placing the goods in condition for shipment to the islands. Since the fiscal year 1911-12 Government supplies are included in the official statistics.

IMPORTS OF CEMENT INTO THE PHILIPPINE ISLANDS, BY QUANTITY, 1919-1922

(Quantities in thousands of pounds)

Imported from—	Average, 1911-1914	1919	1920	1921	1922
United Kingdom ...	436	16	6	6	12
Germany ...	34,450	—	—	—	3,048
France ...	75	—	—	—	5
Austria-Hungary ...	3	—	—	—	—
Belgium ...	835	—	—	—	—
Russia ...	102	—	—	—	—
China ...	8,280	11,558	9,301	9,061	—
Hongkong ...	64,543	8,905	15,999	2,369	8,202
Japan... ..	11,359	43,073	137,575	65,819	63,804
British East Indies ...	71	—	—	—	341
French East Indies ...	20,544	38,766	15,820	10,658	29,666
Spain ...	16	20	398	6	—
Canada ...	—	—	—	16,547	7,550
United States ...	3,842	78	10,455	4,609	2,726
All other countries ...	437	8,188	—	44	—
Total ...	144,993	110,604	189,554	109,119	115,354

Source: Annual Report of the Insular Collector of Customs, Philippine Islands.

Straits Settlements

The imports of cement into the Straits Settlements averaged some 423,108 casks (one cask contains from 380 to 400 pounds), valued at \$1,033,138. Of this amount the United Kingdom and Hongkong exported about equal amounts—155-329 casks, valued at \$377,669, from the former and 155,329 casks, valued at \$383,597, from the latter. Their share in the import trade of the Straits Settlements was about 37 per cent. of the total.

Figures are not available for the imports of cement into the Straits Settlements for the year 1919, but in 1920 some 458,010 casks were imported, an increase of 8 per cent. over the average amount imported during the four pre-war years. Of this amount the United Kingdom exported some 134,585 casks, or about 29 per cent. of the total imports, while Hongkong exported 117,090 casks, or 26 per cent., and French Indo-China shipped 114,392 casks, or approximately 25 per cent. of the total imports. The United States this year furnished about 935 casks of cement or less than 0.5 per cent. of the whole.

In 1921 the Straits Settlements imported 370,402 casks, or 88 per cent. of the average imports for the years 1911 to 1914. During this year Hongkong furnished 138,158 casks, or 37 per cent. of the total imports, while the United States exported only 375 casks.

VALUE OF IMPORTS OF CEMENT INTO THE STRAITS SETTLEMENTS, 1911-1914

Imported from—	1911	1912	1913	1914	Average, 1911-1914
United Kingdom ...	\$345,758	\$406,561	\$449,536	\$308,822	\$377,669
Hongkong ...	185,189	465,086	297,542	413,573	383,597
Malay Peninsula ...	247	88	857	2,086	819
Austria-Hungary ...	26,637	15,726	10,247	2,901	13,878
Belgium ...	13,934	17,664	92,601	14,480	34,670
Denmark ...	96,367	170,014	275,026	143,766	171,293
Germany ...	5,862	11,834	52,471	6,200	19,692
French Indo-China ...	63	3,678	1,392	16,444	5,394
France ...	—	4,771	—	—	1,193
Dutch East Indies ...	37	9,207	15,888	5,984	7,779
Siam ...	—	258	258	—	129
All other countries ...	—	—	12,040	9,706	5,427
Total ...	874,094	1,102,616	1,207,858	947,983	1,033,138

Average price per cask 2.28 2.38 2.65 2.43 2.44

Source: Return of the Foreign Trade of the Straits Settlements.

IMPORTS OF CEMENT INTO THE STRAITS SETTLEMENTS BY QUANTITY, 1919-1921

Imported from—	Average, 1911-1914 Casks	1920 Casks	1921 Casks
United Kingdom ...	155,101	134,585	80,344
Hongkong ...	155,329	117,090	183,158
Malay Peninsula ...	317	1,771	464
Austria-Hungary ...	9,078	—	—
Belgium ...	14,701	419	3,571
Denmark ...	71,393	12,000	49,400
Germany ...	8,223	—	—
French Indo-China ...	2,858	114,392	38,000
France ...	462	—	33
Dutch East Indies ...	3,250	—	—
Siam ...	50	8,693	—
United States ...	—	935	375
All other countries ...	2,346	68,125	60,057
Total ...	423,108	458,010	370,402

Source: Return of the Foreign Trade of the Straits Settlements.

Note.—No detailed statistics are available for 1922 and 1923. According to the monthly summary of December, 1922 the total imports of cement during that year were 325,983 casks. For the three-month period January to March, 1923, the imports of cement totaled 170,705 casks. The Bureau of Foreign and Domestic Commerce is not informed as to the weight of a cask of cement in the Straits Settlements. It appears probable, however, that the term represents the "barrel" of other countries and that the weight is between 380 and 400 pounds, probably about the latter figure. The bureau is not in possession of information as to the exact methods employed in computing values of foreign-trade statistics, but they are believed to be substantially the same as those in use in British India.]

Dutch East Indies

The Dutch East Indies imported an average of 487,957 barrels of cement during the four pre-war years 1911 to 1914. Of this amount the Netherlands furnished 275,752 barrels, or 57 per cent., and Germany 98,757 barrels, or 20 per cent. The United States did not figure in the import trade in cement in the Dutch East Indies during these years.

In 1919 the cement imports of the Dutch East Indies amounted to about 57 per cent. of the average pre-war figure, or 279,251 barrels Japan shipped the largest part of this supply—204,884 barrels, or 73 per cent. of the total importation—while the United States exported some 2,137 barrels, or less than 1 per cent. of the total.

In 1920 the Dutch East Indies increased its imports to 744,176 barrels, or 53 per cent. more than the average amount imported for the four pre-war years. Japan furnished 407,465 barrels, or 55 per cent. of the total importation, while the United States figured to the extent of 11,954 barrels, or 1.6 per cent. The importation of cement by the islands in 1921 was 563,162 barrels, an increase over the average pre-war year of 15 per cent. Japan furnished the larger part of this—307,047 barrels or 55 per cent.—while the United States exported some 9,607 barrels, or 1.7 per cent. Values of the imports of cement are not shown in the Dutch East Indian official statistical reports for any of the years covered by this report.

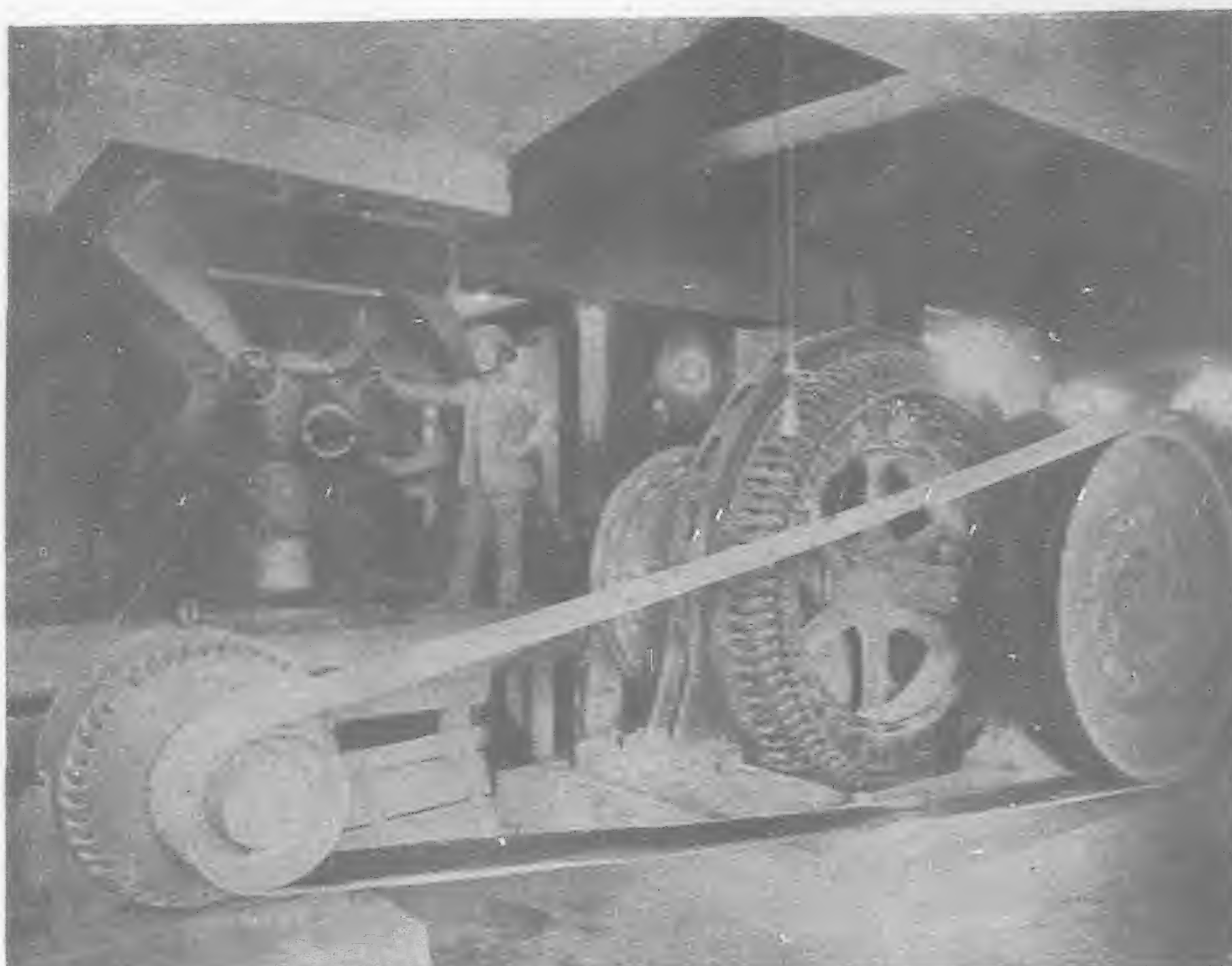
IMPORTS OF CEMENT INTO THE DUTCH EAST INDIES BY QUANTITY, 1919-1921

Imported from—	Average, 1911-1914	1919	1920	1921
	<i>Barrels.</i>	<i>Barrels.</i>	<i>Barrels.</i>	<i>Barrels.</i>
Netherlands ...	275,752	430	10,374	38,269
United Kingdom ...	28,508	850	2,704	3,419
Belgium ...	63,867	—	7,498	1,341
Germany ...	98,757	10	2,000	38,212
France ...	2,055	—	—	—
Other Europe ...	860	—	—	—
China ...	—	44,883	11,250	31,241
Hongkong ...	1,779	22,111	134,552	35,784
Indo-China ...	4,000	3,850	16,319	10,465
Japan... ..	7,839	204,884	407,465	307,047
Denmark ...	—	—	15,507	14,169
Sweden ...	—	—	121,452	49,425
Italy ...	—	—	—	16,470
United States ...	—	2,137	11,954	9,607
All other countries ...	4,540	96	3,101	7,713
Total ...	487,957	279,251	744,176	563,162

Source: Voornaamste Handelsarlekelen op Nederlandsch Indies.

Siam

The imports of cement into Siam for the fiscal years 1910-11 to 1913-14 averaged some 47,553,000 pounds, valued at \$213,135. Chochin-China furnished the largest part of this requirement, 22,610,000 pounds, valued at \$89,641, or 48 per cent. of the quan-



Allis-Chalmers Synchronous Motor (Driving Compeb Mill through Magnetic Clutch) with Belt Driven Exciter

tity and 42 per cent. of the value. For this same period Denmark's exports averaged 16,712,000 pounds, valued at \$82,841, or 35 per cent. of the quantity and 39 per cent. of the value. The United States exported an average of 199,000 pounds, valued at \$1,258, or less than one-half of 1 per cent.

In the year 1918-19 Siam imported 42 per cent. of the average amount bought in the pre-war years above mentioned. The total import of cement for this year amounted to 19,998,000 pounds, of which about 19,762,000 pounds, or 99 per cent., came from Cochin-China. The United States exported about 58,000 pounds to Siam during this year.

In the year 1919-20 Siam imported 17,231,000 pounds, or only 36 per cent. of the average amount imported during the pre-war years. Of this amount Cochin-China shipped 17,181,000 pounds, or 99.7 per cent. the total imports. The United States did not figure in the cement trade of Siam during this period.

In the year 1920-21 Siam's imports of cement amounted to only 31 per cent. of the average of the four pre-war years, the lowest in any of the years covered by this report. Cochin-China supplied some 10,500,000 pounds, or 71 per cent. of the total. The United States shipped only about 7,000 pounds during this year.

Siam's imports of cement for the fiscal year 1921-22 amounted to 39 per cent. of the average pre-war figures, or 18,402,000 pounds, of which Denmark furnished 9,748,000 pounds, or 53 per cent. of the total import, while Cochin-China exported some 4,500,000 pounds, or 24 per cent. of the total.

VALUE OF IMPORTS OF CEMENT INTO SIAM

Imported from—	1910-11	1911-12	1912-13	1913-14	Average, 1911-14
Singapore ...	\$148	\$125	\$719	\$175	\$292
Hongkong ...	32,148	44,848	17,784	24,929	29,927
United Kingdom ...	4,725	4,251	1,481	2,153	3,402
Germany ...	965	302	109	8,746	2,531
Denmark ...	64,557	56,543	97,649	112,616	82,841
Belgium ...	4,919	1,571	247	—	1,684
Cochin-China ...	61,928	91,297	98,978	106,362	89,641
China ...	—	112	753	445	327
Dutch East Indies ...	2,780	1,872	34	—	1,173
Netherlands ...	—	—	238	—	59
United States ...	—	—	—	5,031	1,258
Total ...	172,170	200,921	218,992	260,457	213,135

Average price per 100 .42 .42 .45 .50 .45
Source: Foreign Trade and Navigation of Siam.

IMPORTS OF CEMENT INTO SIAM, BY QUANTITY
(Quantities in thousands of pounds)

Imported from—	Average, 1910-14	1918-19	1919-20	1920-21	1921-22
Singapore ...	48	12	—	29	293
Hongkong ...	5,858	—	—	219	3,405
United Kingdom ...	442	164	41	26	55
Germany ...	283	—	—	—	—
Denmark ...	16,712	—	—	3,935	9,748
Belgium ...	886	—	—	—	—
Cochin-China ...	22,610	19,762	17,181	10,500	4,500
China ...	45	—	—	—	4
Dutch East Indies ...	461	—	—	—	397
Netherlands ...	9	—	—	—	—
Japan... ..	—	2	9	—	—
United States ...	109	58	—	7	—

Total ... 47,553 19,998 17,231 14,716 18,402

Source: Foreign Trade and Navigation of Siam.

Nobel at Wembley

Nobel Industries' Exhibit at the British Empire Exhibition, 1925, has been designed to show the whole range of the products of Nobel associated companies and also to give visitors an insight into the manufacture of certain products.

The exhibit embraces numerous types of explosives and gun-powders used for industrial purposes, propellant and disruptive explosives, brass cartridge cases, fuzes for shells, small arm ammunition, sporting cartridges (including an exhibit shewing their actual assembly), metal products in a raw and in a semi-manufactured condition, nails, gas mantles (the latter actually being made, lamps, new collodion products in the form of enamels and varnishes and the effects which can be produced with them; radiators, motor accessories, welding plant, leather cloth for all kinds of upholstery purposes, and many applications of the Lightning Fastener; samples of the fertilizers produced at factories in South Africa and Australia, as well as a variety of chemical products, are also included.



General View of Exterior of Nobel Bay

Nobel products contribute in a larger measure than is generally appreciated to the sum of commodities necessary for modern conditions of life.

For example, the importance of explosives in the development of industry will be appreciated from the fact that they are used for winning coal and metal ores from the mines of the Empire thus being the first agent in the provision of many materials fundamentally and economically necessary to humanity; semi-manufactured goods of non-ferrous metal, such as brass and copper rods, wire, hollow brass and copper ware, brass fittings of all sorts, collodion products, leather cloth and other commodities in the exhibit illustrate this point. Nobel's also own and operate a mint, and are therefore, equipped to execute coinage contracts for Overseas Governments.

Analytical, research and metallurgical chemists, mechanical and chemical engineers and other specially trained experts collaborate continuously in the development of the manufacture of these highly technical products; thus constant attention to the improvement of the quality of existing products, and to the development of new ones, has led to the name Nobel being recognised as the standard of quality throughout the world for the commodities with which it is identified.

The British Empire Exhibition in 1924 and in 1925 has afforded an opportunity of presenting in concrete form particulars of the products of the associated companies of Nobel Industries in one composite exhibit, and arrangements have been made to present visitors with a specially designed medal minted in the coining press in the Nobel Bay in commemoration of this event.

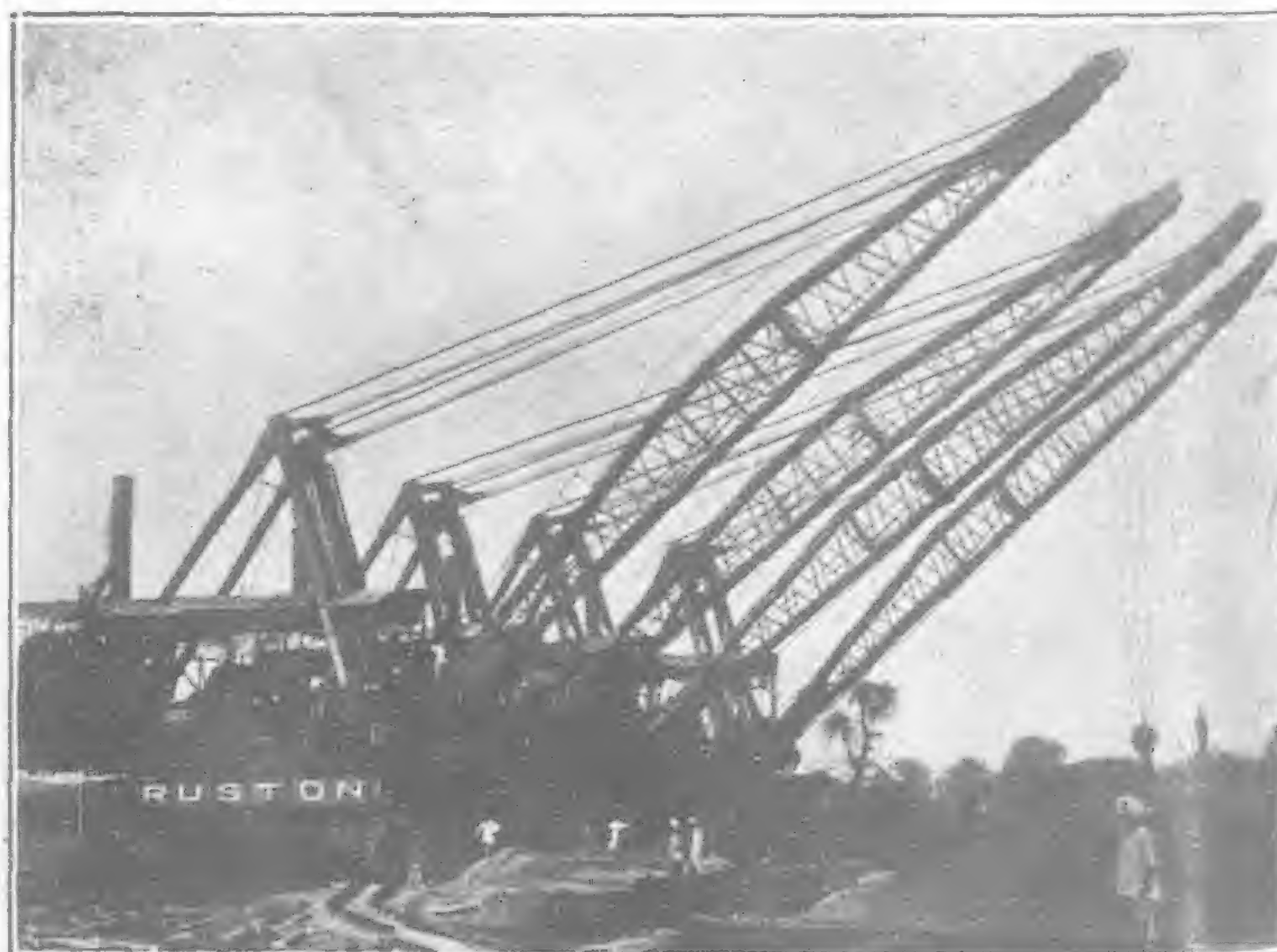
Thornycroft Depot at Singapore

A new sales and service depot has now been established by Messrs. J. I. Thornycroft & Co., Ltd., at Singapore for motor vehicles, motor boats, marine engines and other productions of the company in the Malaya markets. After a lengthy experience in the works in England one of the company's representatives went out to Singapore to superintend their interests and the success of his efforts has resulted in the new depot with a capable staff



Thornycroft Sales and Service Depot at Singapore

of mechanics. Ample stocks of spare parts are carried and users of Thornycroft vehicles will have a first class service at their disposal. The enterprise of Messrs. Thornycroft in establishing depots in all parts of the world, cannot fail to instil confidence in minds of prospective purchasers and they are certain to reap their due reward in the shape of orders for motor vehicles.



Four of the Six 350 Tons "RUSTON" Machines supplied against the World's Largest Order for Dragline Excavators. These Machines are now working on the Lloyd's Barrage & Canals Construction Scheme preparing Waterways having a bed width of 280 feet, and their suitability is indicated by the order placed by the Director-General, India Store Department, for two additional "Ruston" Dragline Excavators.

The Electrification of the Java State Railways

THE construction works in connection with the railway electrification around the city of Batavia were originally planned to be started in 1918. Economical depression delayed the erection of these works which were begun not earlier than 1923 and at a slower rate than was initially intended.

The business section of Batavia is seven miles north from the residences Weltevreden and Meester Cornelis and about seven miles

west of the new harbor at Tandjong Priok. On account of this wide distribution and of the necessity of rapid passenger transportation between these points, it has been decided to electrify the network of steam railroads connecting the various points of the district of Batavia. This electrification is to be considered as the first step of an anticipated extensive program, comprising several heavy trunk and mountain lines.

The first sections of the Batavia electrification consisting of a length of 15.6 k.m. (9.76 miles) double track, extending from Tand-

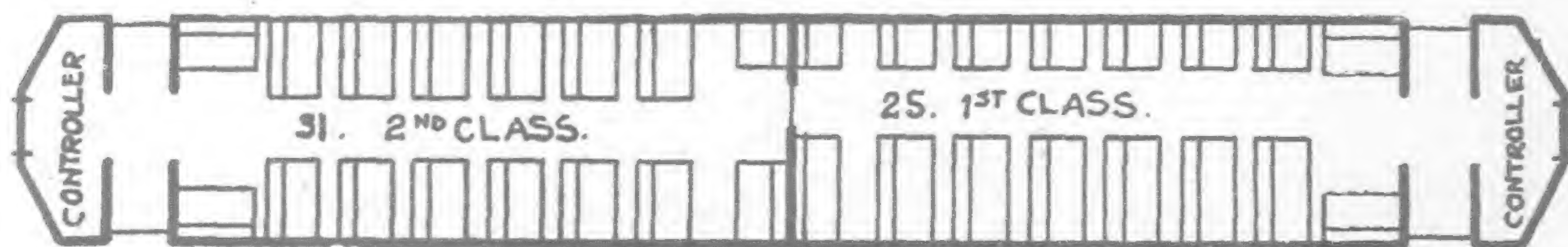


Fig. 1



Fig. 2

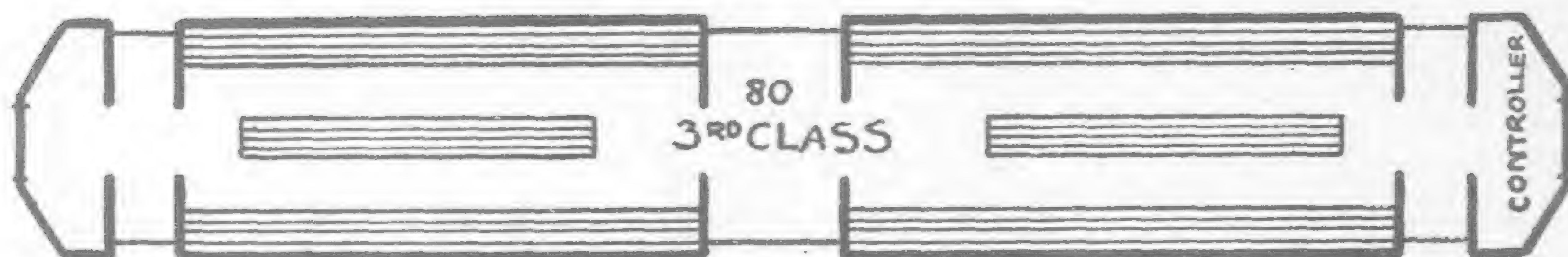


Fig. 3

440 to 500 H.P. Motor Cars with 44 ton Trailers



Locomotives in the Java State Railways



At Tandjong Priok Station

jong Priok to Mr. Cornelis, the freight center near Batavia, a length of 2.6 km. (1.62 miles) double track connecting Mr. Cornelis to Manggarai, together with extensive yards, have now been taken in regular service.

The next section that is rapidly nearing completion and will come into service in the course of this year, extends from Batavia to Tandjong Priok, a length of 8 km. (5 miles) double track. A double track line from Weltevreden to Manggarai, a length of 4.4 km. (2.75 miles) will be completed next year.

From the hydro-electric power house at Tjitjatih or Oebroeg, 89 km. (55 miles) from Mr. Cornelis, three-phase 70,000 volt transmission lines conduct the power to a substation at Mr. Cornelis and one at Antjol 4.4 km. (2.73 miles) from Tandjong Priok where it is converted to 1,500 volts direct current at which the trains operate.

These substations which are 11.2 km. (7 miles) apart, are equipped with motorgenerator sets, developing each 1,500 kilowatt in two series connected 750 volt generators. Two of these sets have been installed at Mr. Cornelis, with provision for a third unit, by the General Electric Company and three sets at Antjol by The Allgemeine Elektrizitaets Gesellschaft.

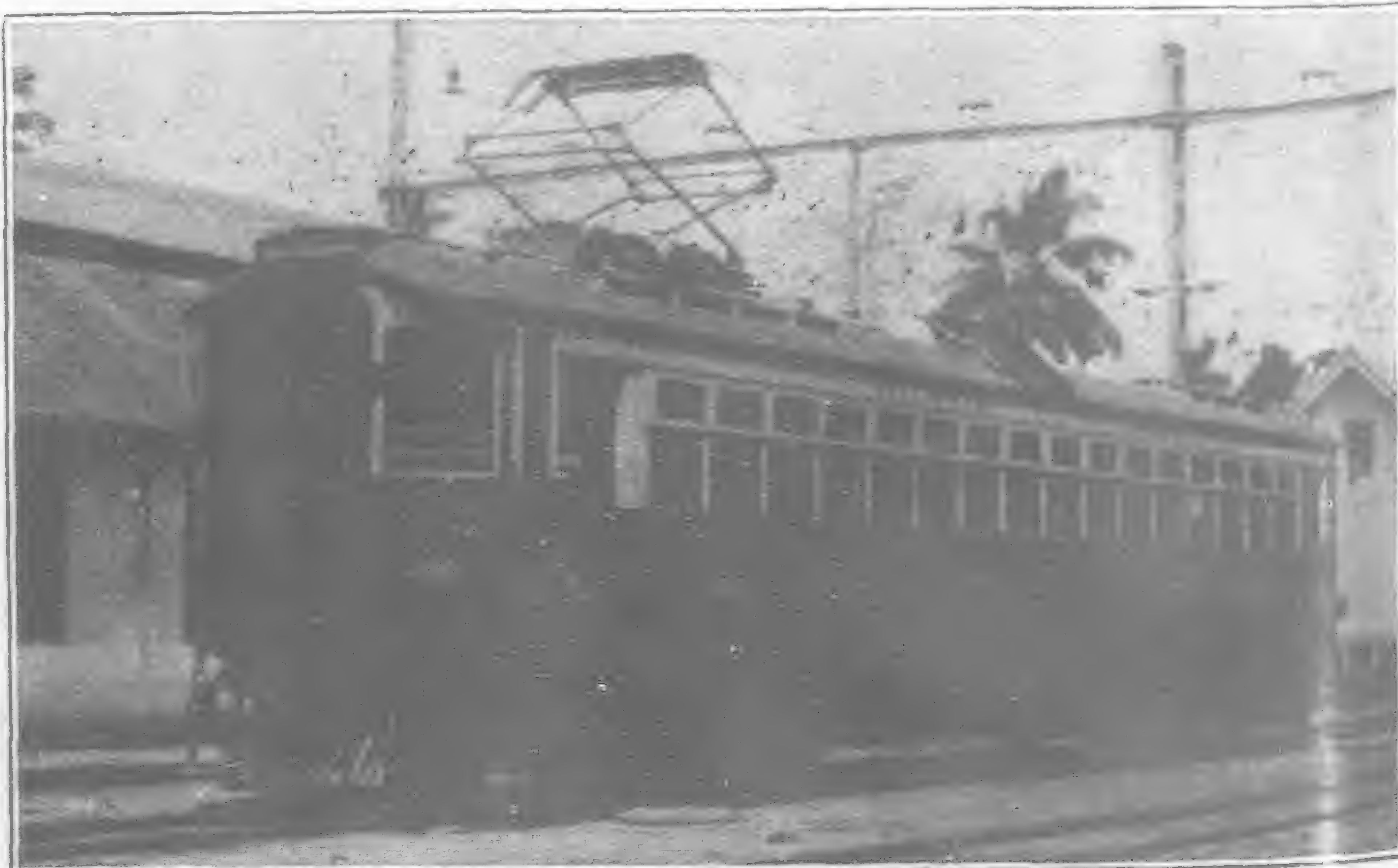
The overhead construction is of the single flexible catenary type of Siemens Schuckert. The average distance between messenger supports on tangents is about 75 meter (230-ft). In curves up to 450 m. (1,500-ft.) radius, messenger

spans down to 43 m. (143-ft.) are used without an intermediate pull-off. In sharper curves the distance between supports is 75 m. (250-ft.) with a pull-off pole halfway between supports. On yards messenger spans vary from 75 m. (250-ft.) to 32 m. (107-ft.) according to number of switches and other local circumstances. Cross span and steel bridged supports are used. An extensive use of steel bridge has been made on the Tandjong Priok and Mr. Cornelis yards, while the yards at Manggarai are provided with cross spans, which are slightly more expensive, but have the advantage of causing less interference with the view of the motorman. In order to increase the current carrying capacity, the spans on main track comprise two 107 mm² (0.166 sq. inch) copper trolley wires, suspended from a 150 mm² (0.233 sq. inch) stranded copper messenger; side tracks comprise one 107 mm²

(0.166 sq. inch) copper trolley wire, suspended from a 70 mm² (0.109 sq. inch) copper messenger. On yards all messengers are of 70 mm² (0.109 sq. inch) steel cable, except at Tandjong Priok and Batavia where copper cable of 150 mm² (2.33 sq. inch) for main track and of 70 mm² (0.109 sq. inch) for side track is used to prevent corrosion by the sea-air. Trolley wires are at a height above top of rail of 5.50 m. (18.3-ft.) on ordinary track and of 5.80 m. (19.3-ft.) on yards and



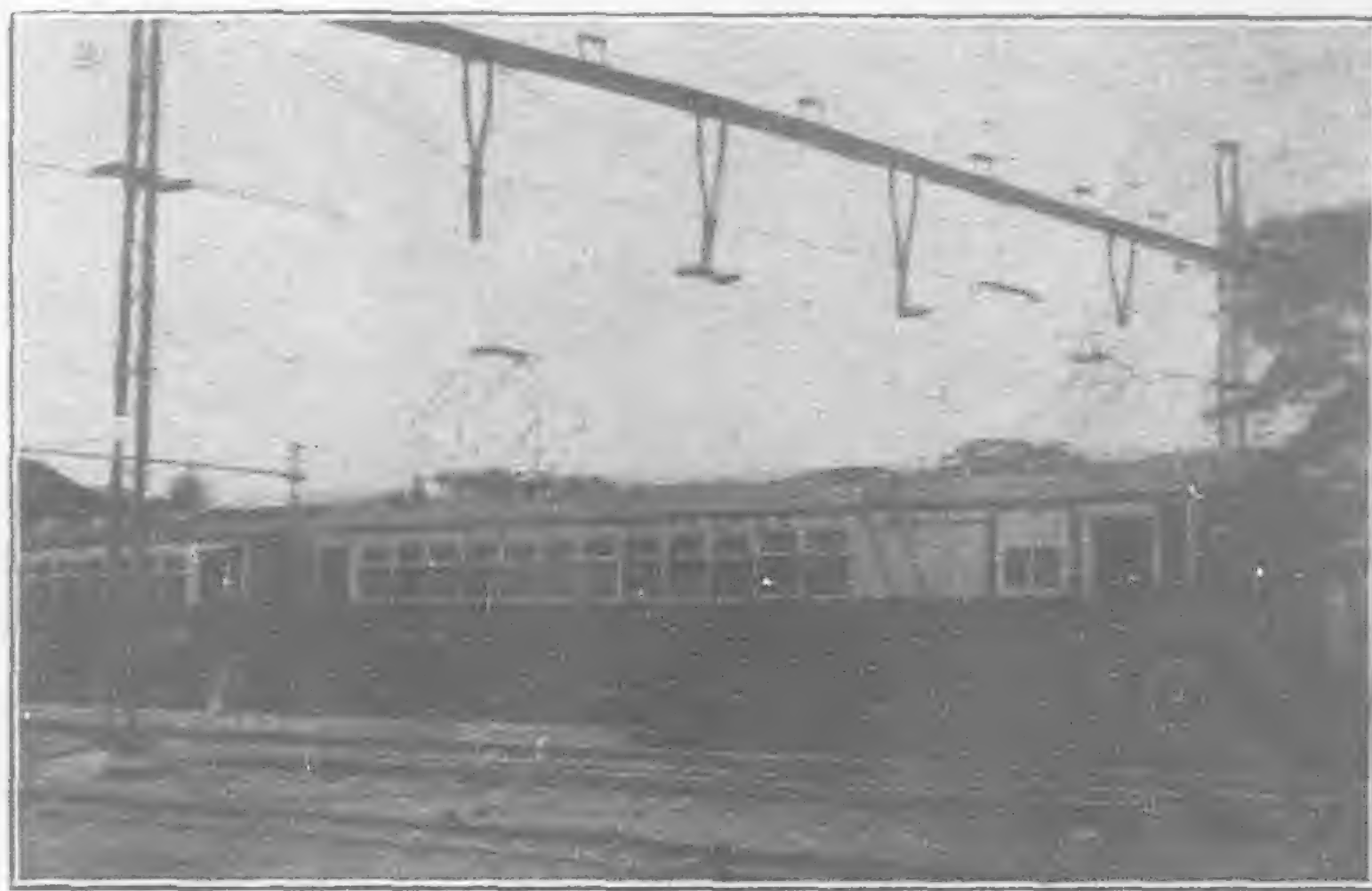
The Interior of a Car



A General Electric Company Tram



Meester Cornelis Substation



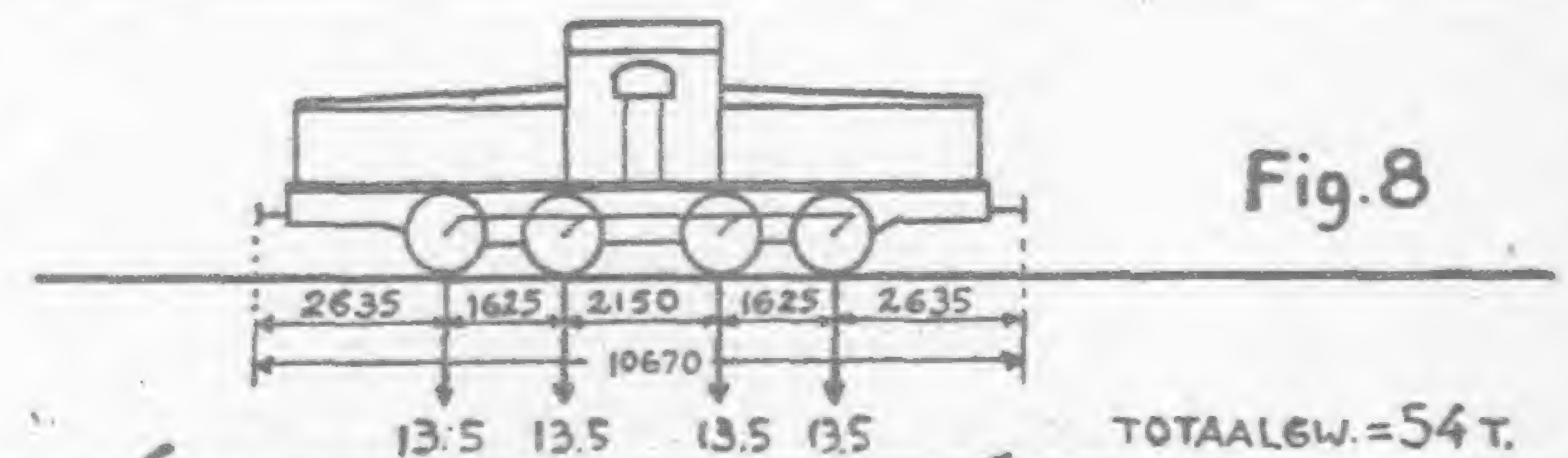
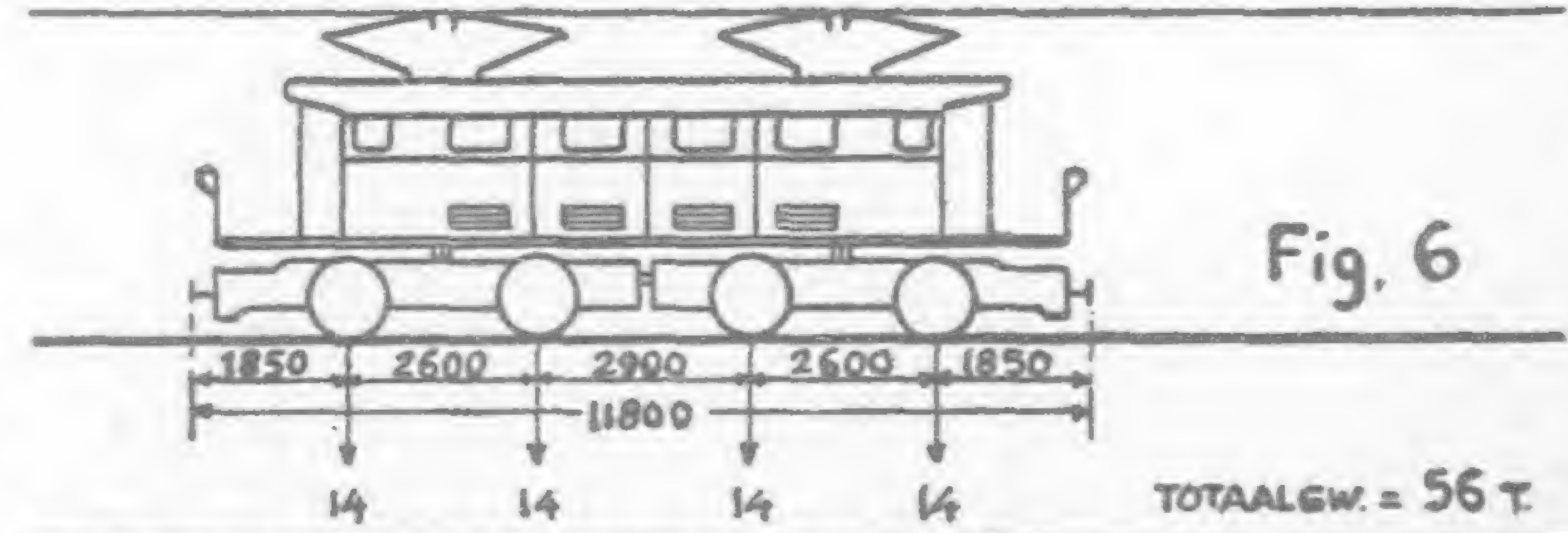
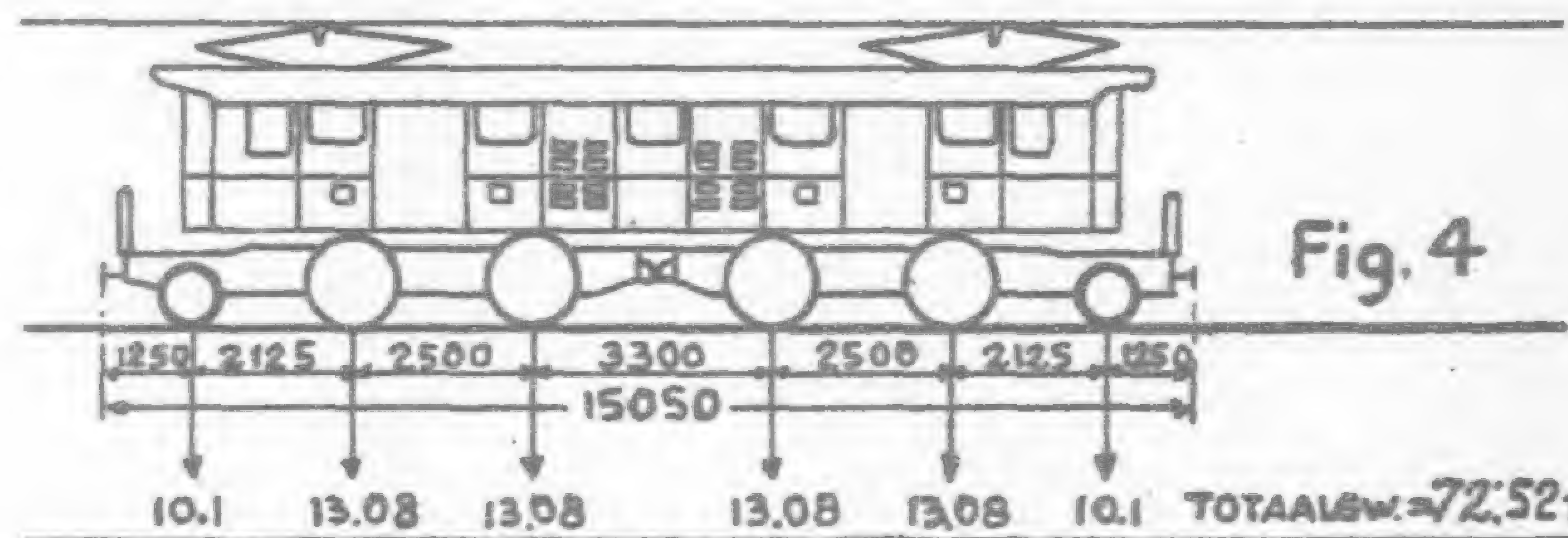
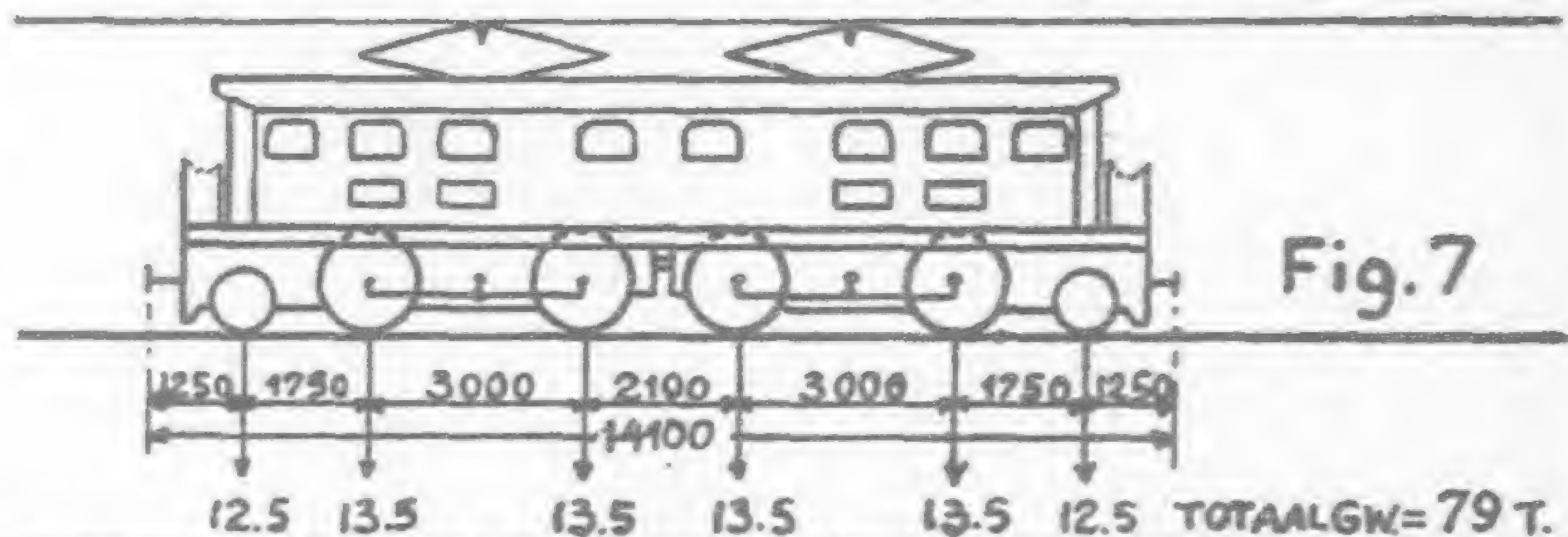
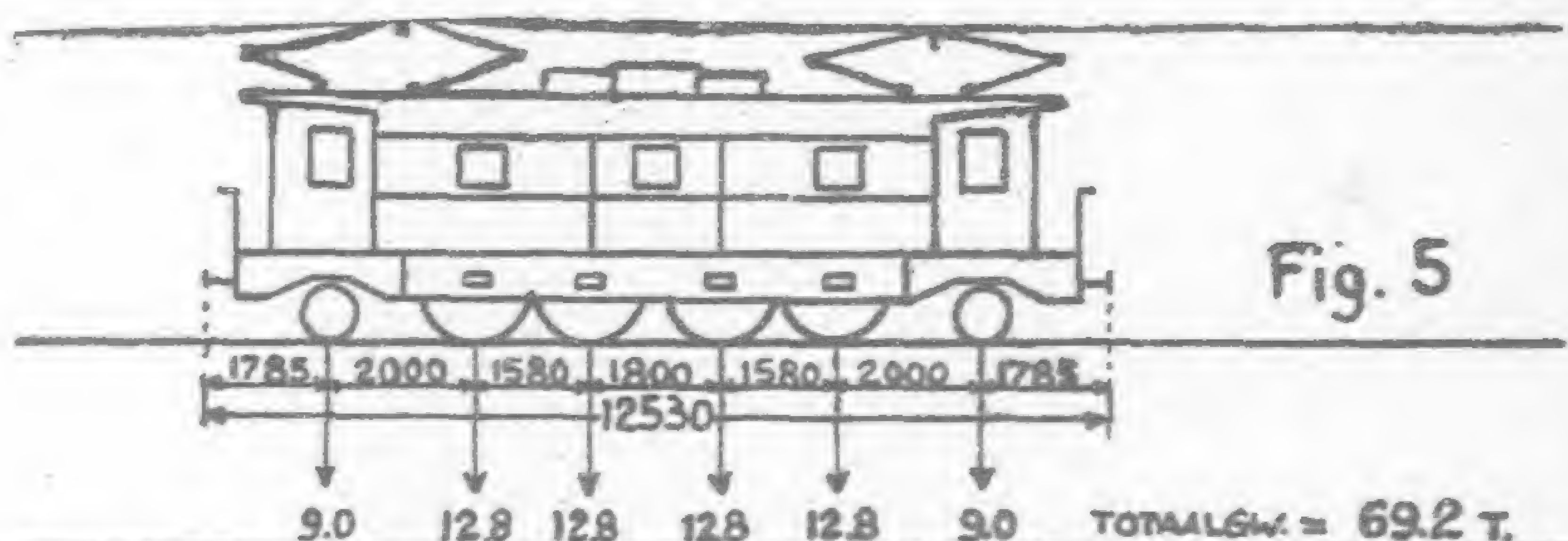
Westinghouse-Heemaf-Werkspoor Motorcar with Luggage Compartment at Meester Cornelis Yard

hangers are spaced 10.50 m. (35-ft.) apart on tracks and 12 m. (40-ft.) on yards.

Motor trains running at intervals of 15 minutes between Mr. Cornelis and Tg. Priok, cover the distance of 15.6 km. (9.8 miles) with five intermediate stops in 22 minutes. The cars with speeds up to 75 km/h (47 miles/h) (90 km/h in case of emergency) operate singly or in train units consisting of one motor car and one trailer and the train assemblage consists of from one to four of these units.

The 440 to 500 h.p. motorcars weighing approximately 44 tons and trailers weighing 34 tons are equipped with all modern appliances for comfort and safety as fans, reversible seatbacks, entrances with enclosed steps, and devices for ease and economy of operation are provided as automatic acceleration, air-brake system for normal service and rheostatic braking in emergency cases. Ten units have been furnished by the General Electric Company and five units by the Westinghouse Company.

Two 1,200 h.p. Westinghouse-Heemaf-Werkspoor locomotives (Fig. 4) are intended for hauling passenger trains at a maximum speed of 85 km/h (53 miles/h) and freight trains at a maximum speed of 45 km/h (28 miles/h) on level track; they are also intended



Locomotives Built by the Allgemeine Elektrizitaets Gesellschaft

for service on the interurban line from Batavia to Buitenzorg (12½% grades) and on heavier mountain trunk lines.

The Brown Boveri Company delivered to 1,500 h.p. locomotives which are specially adapted for hauling trains at high speeds up to 90 km/h (56 miles/h) on level track.

Three locomotives built by the Allgemeine Elektrizitaets Gesellschaft are intended, the one (of 900 h.p.) for freight service on heavy mountain lines at moderate speeds and the two other ones (of 1,600 h.p.)—which have still to be delivered—for passenger service on level lines at a maximum speed of 90 km/h.

Two switching locomotives equipped with an exide storage battery of 275 amp. hours and 360 volts at discharge for out of the way yard work have been furnished by Siemens Schuckert-Werkspoor; maximum tractive effort at starting is 5,600 kg.

Though one type of locomotive may give satisfactory service in handling all freight and through passenger traffic on the railroads within the Batavia district consisting exclusively of level track, it has been deemed necessary to have four types tried out with a view to the extensive electrification program to be carried out in the near future.



A large No 300 Ruston Dragline—one of eight sent out to India—alongside a small $\frac{1}{4}$ Cubic Yard Crane Navy on Caterpillar tracks



A Steam Crane Navy clearing ground for new Sewage Work at Bradford

Design and Applications of Power Shovels and Draglines

By W. Barnes, M.I. Mech. E.

The following lecture was delivered before a large and interesting audience of Japanese engineers of the Koseikai at the Imperial Railway Society of Tokyo on October 7, 1925.

Power Shovels and Draglines

One of the outstanding features in this age of mechanical progress and the use of machinery is the application of the Single Bucket Excavator to practically all kinds of excavation work.

This type of excavator includes three distinct designs:

FIRST. The Steam Navy as it is called by the English makers and Steam Shovel by the American.

SECONDLY. The Dragline.



The huge Bucket of the big Electrically operated Crane Navy for Australia

THIRDLY. The Grab, so called by the English, and Clamshell by the American.

These were formerly all distinct machines by which it is meant a machine designed for use as a Steam Navy could not be adapted for use as a Dragline or Grab and so on.

It is now possible, however, to obtain one machine which will perform all three duties without in any way spoiling the efficiency of any of them, a feature which is of extreme value to Railroads, Municipalities, and Contractors as it means three machines in one at a slight increase in the cost of one.

It frequently happens of course, that one class of excava-



A small Steam Crane Navy with 1½ Cubic Yard Bucket mounted on Caterpillar tracks excavating iron ore



A Steam Crane Navy on Caterpillar tracks excavating iron ore and loading wagons on the surface of the cutting

tion work is more suitable for the use of a Steam Navy than for a Dragline or Grab and vice versa and the owner of such a machine whose excavation work is of a varied character is at a great advantage in owning one of these machines, a contractor particularly so, as he can put in lower bids for various classes of work and secure more work as the result.

Before describing the main features of these machines, it will be interesting to look into the history of the Single Bucket Excavator.

The first machine was designed by William Otis of Philadelphia in 1839 and built by John Souther Boston, U.S.A., and was called a Steam Shovel because it embodied all the motions of a man using a hand shovel and applied steam to work it; in other words the excavating gear consisted of a scoop or shovel on the end of a radial arm, exactly like our present day machines. This was thrust into the material to be excavated and when full was withdrawn from the excavation, swung round and discharged. The carriage or truck and the jib of the Otis machine were constructed of timber and although the design was very good embodying as it did most of the leading features of the present day machines, the construction was comparatively poor and as hand labour was cheap and efficient compared with the present day, very few of these machines were constructed.

The next excavator to come on to the market was the Dunbar and Ruston Steam Navy in 1875 designed and manufactured by Ruston, Proctor & Co., Ltd., (now Ruston and Hornsby, Ltd.) of Lincoln, England.

The manual worker with a pick and shovel is known in England as a navy so the English firm called their machine a *Steam Navy*.

The most useful feature of the Ruston machine was its mild steel construction to replace the wood used on the Otis machine. This was such a valuable feature that it is interesting to note a number of these machines are still at work. One of them made by Rustons in 1876 and thus 49 years old is still successfully working day in and out excavating clay for brickmaking at Newcastle, England a proof of the sound construction of the old Ruston Navy. Hundreds of the Old Ruston Navvies with 2½ cubic yards-buckets were constructed and between 70 and 80 were used to excavate the Manchester Ship canal.

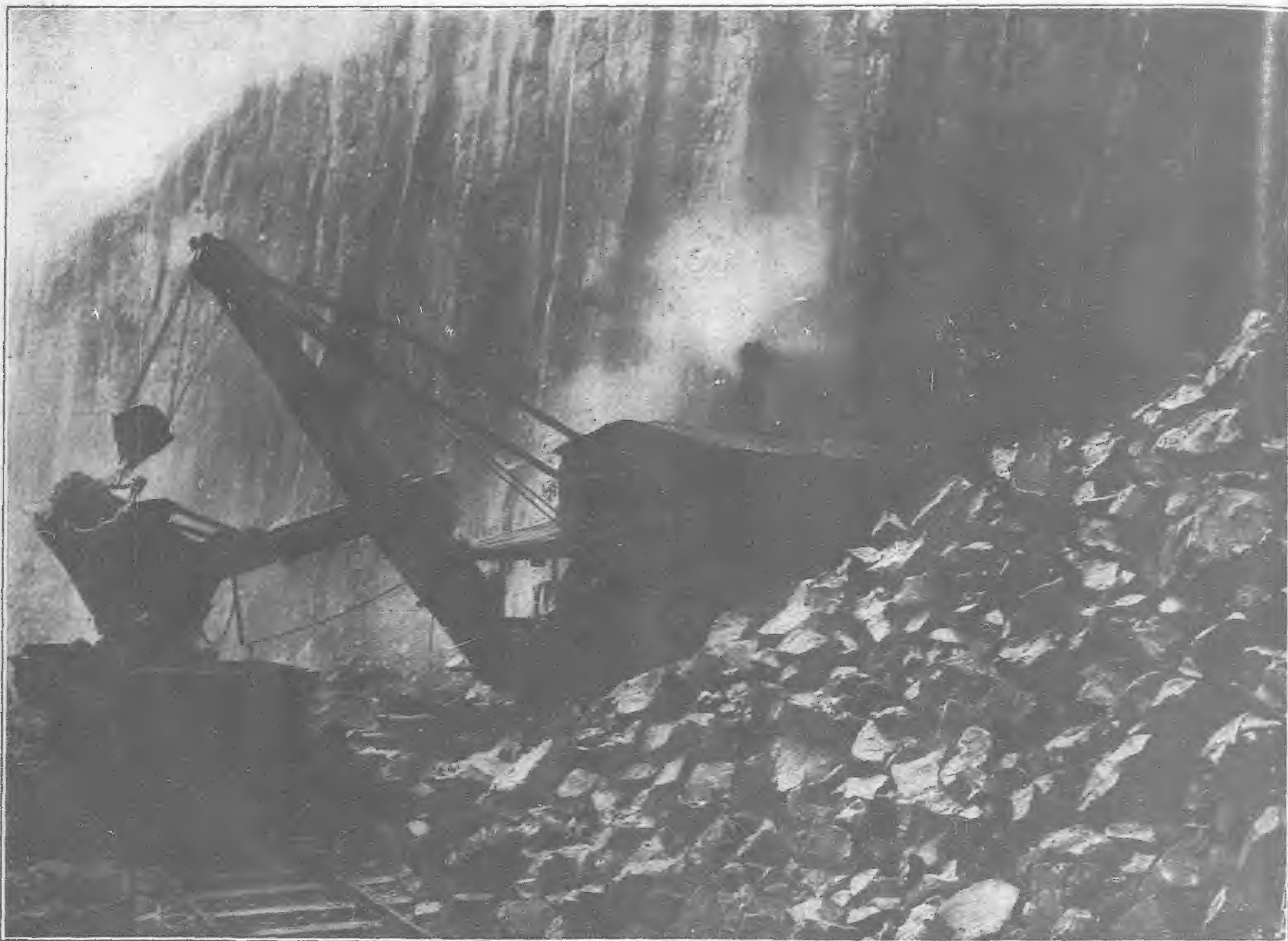
Other American firms entered the market six to eight years after the Ruston machine, the Bucyrus Co., of Bucyrus and Marion Co., of Marion, both of Ohio, U.S.A.

The machinery of all these excavators inclusive of engines and boilers were mounted on a long framing or carriage supported on flanged wheels for running on rails, the excavating gear consisting jib, bucket arm and bucket being fitted at the front of the machine. The construction was of such a character that it was only possible to revolve or swing the excavating gear through 180 degrees or in other words, half a circle.

This had a certain disadvantage in the fact that the excavating could only be carried out ahead of and at the side of the machine and the wagons could only be filled by running them alongside the excavator.



A Steam Dragline widening and deepening the River Nene at Peterboro in connection with a flood prevention scheme



A Crane Navy loading basalt rock after it has been blown down from a deep face.

Further the design was such that the jib was comparatively short which somewhat reduced the cutting height of the machine as well as the dumping or discharging radius. Another disadvantage was that when the machine had cut its way the full length of a long face it either had to be travelled back again the full length of the face to enable the succeeding cuts to be taken in the same direction, or the machine turned bodily round including the undercarriage, a somewhat lengthy and costly proceeding unless there was sufficient room to enable the machine to travel itself on rails laid to a more or less half circle.

In the year 1887 Whitaker & Sons of Leeds, England, applied the standard type of excavating gear to the jib of a locomotive travelling crane and called it a Steam Crane Navy which the Americans translated into Full Circle Shovel because of the fact the machine can revolve through a complete circle.

John H. Wilson & Co., of Liverpool, England, then introduced a Crane Navy of their own design in 1888 and these machines held the field until the Thew Co., of America brought out what they called the Thew Automatic Shovel.

In 1902 Ruston and Hornsby, Ltd., of Lincoln came into the market with a Crane Navy and purchased the Whitaker drawings and patents in 1910.

At first the American makers of Steam Shovels, other than the Thew, somewhat ridiculed the Crane Navy owing to it being somewhat slower in swinging. This is explained by the fact that in the original Steam Navy and Shovel types only the excavating gear consisting of jib, bucket arm and bucket were revolved, whereas in the full circle machine the whole of the superstructure supporting the engine and boiler as well as the excavating gear had to be slewed.

Its practical advantages however were such that the prejudice was overcome and all the steam shovel makers introduced designs embodying the full circle principle although most of the American makers did not come into line until about 1912.

The chief advantages of the full circle machine are as follows:

- (1) It will cut equally well in any position around its centre.
- (2) It can also load wagons or dump at any point in the working radius.
- (3) The design enables a longer jib to be used than on the old steam navy and shovel types which makes it possible to take wider and deeper cuts.
- (4) It is possible to adapt this machine for use either as Crane Navy, Dragline, Grabbing Crane, or even, as a Crane and Pile Driver.

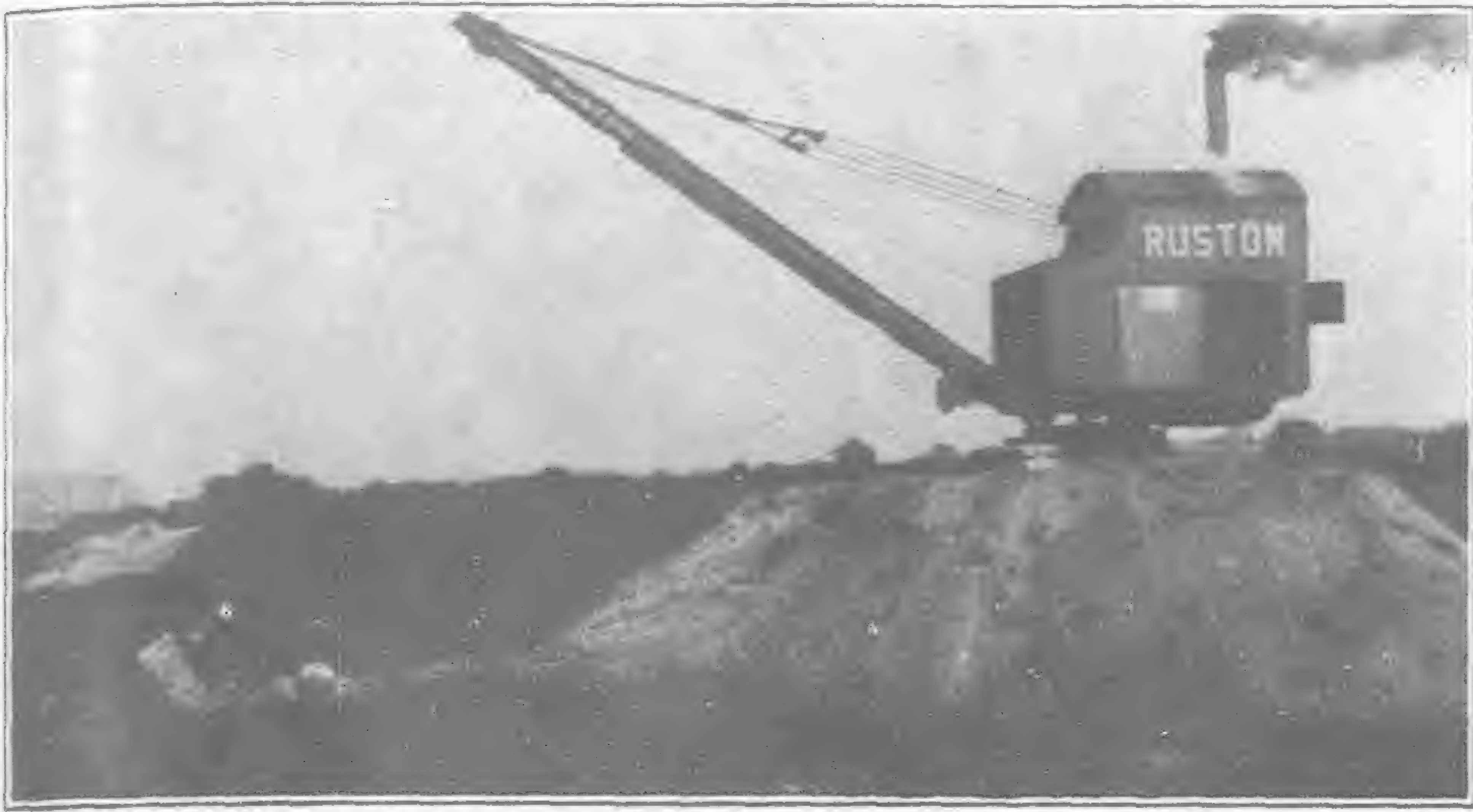
For the above reasons the full circle machine has almost superseded the limited swing shovels, and greatly increased the use and scope of single bucket excavators.

The most recent improvement is the substitution of self-laying tracks or caterpillars as they are more usually called, for flanged wheels and rails.

It is rather interesting to learn and somewhat bears out the old saying "there is nothing new under the sun," that patents for self-laying tracks for vehicles are recorded in the British Patent office as far back as the year 1650, although it is only within the last twenty years they have become a commercial success, assisted doubtless by the tanks during the war which appealed to the imagination of the public.

Although caterpillar travelling gear adds from 20 per cent. to 30 per cent. to the weight and price of an excavator, it is well justified because of the saving in the cost of working. Flanged wheels involve much time and labour in laying the necessary rails and sleepers, as well as in leveling the ground to receive them. In other words an average of four men is necessary and 20 per cent. of the working time is occupied in moving the machine ahead for another series of cuts, or transporting it from one place to another.

With caterpillar gear only one or two men are required around the machine and even these are sometimes dispensed with. The



A Steam Dragline removing the old and now obsolete fortifications of Paris

time occupied in travelling is also reduced to 5 per cent. or less of the total working time.

The single Bucket Excavator embodies the following duties :

- (1) Digging.
- (2) Regulating the thickness of cut.
- (3) Slewing, by means of which the bucket is swung out of the working face over the dumping point.
- (4) Travelling.

The Digging gear on a Crane Navvy consists of a bucket or scoop on the end of a radial arm suspended approximately half way up a heavily constructed type of Crane Jib.

The thickness of cut and the discharging radius of the bucket and arm are regulated by thrusting the arm in or out by means of racks upon the bucket arm, gearing into pinions mounted upon a shaft on the jib.

The racking shaft upon which the pinions are mounted is driven from a small set of reversing engines bolted to the upper side of the jib. The length of stroke upon the bucket arm, that is the variation in the cutting and discharging radius of the bucket varies from 5-ft. 0-in. to 25-ft. 0-in. according to the size of the machine.

The power for digging is obtained from a set of double cylinder engines mounted upon the main or revolving superstructure of the machine. These should preferably be fitted with link motion reversing gear by means of which the steam is cut off at about $\frac{1}{4}$ of the length of stroke to give economy without reducing the efficiency of the machine. On some excavators this is dispensed with on the score of cheapness and the steam taken the full length of stroke, in other words the slide valves have no lap or lead.

The Digging motion is transmitted from the main or digging engine to the bucket by means of a wire rope coiling on to a drum driven by means of gearing from the engine, exactly like a simple hoisting or winding engine. The grooves upon the drum and also in the pulleys around which the wire rope passes should be machined to take the wire rope in order to reduce the wear upon the rope and prolong its life. In some machines the grooves are cast in and in others the grooves in the drum are omitted altogether. This is not good practice, because the rope is liable to overlap and become damaged.

A cut is taken and the bucket filled by allowing it to rest on the ground opposite the cut to be taken with the bucket arm hanging in a more or less vertical position. The hoisting or winding engine is then set in motion and the bucket is dragged forwards and upwards into the face at a speed which may reach two feet per second or more in easily dug material.

The thickness of the cut is regulated by means of the racking engines mounted upon the jib, the ideal method of working being to so regulate the digging that a cut of even thickness is taken from the bottom to the top of the

face, so that the bucket is filled just as it reaches the end of the cut or top of the working face.

This thickness depends upon the nature of the material and depth of cut. In heavy plastic clay it may not be possible to cut more than 2-in. thick, but in light loose material which falls to the foot of the face, the bucket can be loaded by thrusting it in a foot or more into the loose heap and withdrawing it when full.

The material is discharged from the bucket by means of a flap door. This is held in position by means of a latch which is withdrawn by the driver by means of a manila or hemp rope when the bucket is in position over the wagon or dumping point.

It should be noticed that the radial digging action of a Crane Navvy is upwards and away from the machine which necessitates the machine standing in the bottom of the excavation.

In the more recent type of single bucket excavator known as a Dragline the machine

stands on the surface of the excavation and cuts below the level upon which it stands which makes it especially useful for making river cuts, canals or drains or for cleaning out and widening existing ones, as the presence of water in the cutting does not prevent the use of the machine owing to the fact it stands on the surface of the cutting. This feature also makes the machine valuable for the excavation of sand and gravel from below water level. The construction of a dragline bucket is altogether different from that of a Crane Navvy. In both cases a renewable lip plate of special mild steel or manganese steel is fitted to the front of the bucket upon which a number of teeth, usually four, are mounted to assist the cutting action. In all other ways they are different in design. The bucket of the Crane Navvy is, as already mentioned, fitted with a flap door at the opposite end to the open or cutting end by means of which the contents are discharged.

The Dragline bucket is more like a scraper bucket or scoop open at the top as well as to front end and no door is fitted, the excavated contents being dumped from the front or cutting end by allowing the bucket to fall suspended in a vertical position with the teeth and open end downwards.

The cutting action of a Dragline is quite opposite to that of the Crane Navvy. When using a Crane Navvy the cut is taken above the level of the ground, upon which the machine stands, and away from the machine, whereas in a dragline the cut is below the working level of the machine, the bucket being dragged towards the machine by means of the digging rope which coils on the digging drum exactly as on the Crane Navvy.

In a Crane Navvy the thickness of the cut is regulated by means of a separate set of engines controlling the working radius of the bucket, which is mounted on an arm. In a Dragline the racking



A small Crane Navvy digging heavy slag

engines are dispensed with, another drum mounted on the revolving superstructure taking their place. The wire rope from this drum leads over pulleys at the jib head to the bucket to which it is secured. The bucket is hoisted out of the excavation and the thickness of cut regulated by means of this auxiliary drum. The method of working is as follows:

The bucket is lowered out from the jib head so that it rests in the bottom of the cut at the extreme working radius. The digging drum is then put into motion and the bucket dragged into the material towards the machine by means of the digging rope which passes out at the foot of the jib around a set of suitably designed pulleys. The thickness of the cut is regulated by means of the tension on the hoisting rope which passes over the pulleys at the extreme end of the jib, the bucket being slightly lifted out of the excavation if too deep a cut is being taken and the engine show signs of stalling.

When the bucket is full the digging drum is engaged and the bucket and its contents are lifted out of the excavation by means of the hoisting rope. The bucket is discharged by holding it up on the hoisting rope and slacking off the digging rope. This allows the bucket to swing forwards and downwards, the contents being discharged from the open mouth as previously described.

The digging action of a Grab is altogether different from that of either a Crane Navy or Dragline and can be likened to the closing of the human hand when it is used to pick up a handful of loose material. The bucket really consists of two segments hinged

together at the corners. To dig or pick up a bucket of loose material, the grab is lowered on to the material with the full weight of the open grab resting upon it. The two segments are then drawn together and closed by means of the digging rope which passes round a series of pulleys near the upper or hinged end of the grab. The contents are discharged by holding the grab up on the hoisting rope, which coils on an auxiliary drum, and lowering out the digging line or rope which allows the segments to open and discharge the material.

We have now discussed the digging action of the three types, Crane Navy, Dragline and Grabbing Crane. The modern excavator is so designed that the conversion from one type to another can be quickly and easily carried out.

Supposing the excavator is being used as a Crane Navy and it is required to convert it for use as a Dragline, the excavating gear consisting of jib, bucket and arm is detached from the front of the revolving superstructure by means of pin joints and a Dragline type of jib which is longer and lighter is fitted in its place. An auxiliary or hoisting drum is then fitted in front of or alongside the digging drum, everything being arranged to receive it, or, the drum can be fitted when the machine is erected in the first place and left in position. In that case, all that is necessary, in addition to replacing the crane navy jib with the dragline jib, is to couple the necessary wire ropes from the digging and hoisting drums to the bucket. The whole of the change over can be effected in 3 to 4 hours.



An Electrically operated Grabbing Crane. The excavating equipment is interchangeable for use as Crane Navy or Dragline

The change over from the Dragline to Grab is still more easy as the Dragline and Grabbing jibs are common to both types so it is only necessary to change the buckets and couple up the special rope supplied for use with the grab or vice versa.

The slewing and travelling gears are common to all three types of machines and no alteration of any kind is necessary when the change over from one to another is made, even on the largest machine.

In addition to being readily convertible from one type to another, the modern machine is very fast in working and at the same time easily operated.

In the early type of excavators one engine controlled all the motions and hand operated clutches were used for the various operations of hoisting, slewing, and racking. In the present day machine separate engines are used for digging, slewing and racking, engines being the largest and about 50 per cent. greater h.p. than the slewing and racking engines, which are usually of the same size. The travelling gear is driven from the main or digging engines by means of positive clutches as this gear is only occasionally required. The necessity for making the machine easy to operate can be judged from the fact that a small and medium sized excavator with a bucket up to 2½ c.y. capacity can make 2 to 4 cuts or complete cycles of operations per minute, the exact speed depending upon the size and make of the machine, nature of the material and the skill of the operator.

A cycle of operations comprise digging and racking, slewing the bucket round over the dumping point, dumping, slewing the bucket back into the working face and lowering it in readiness for the succeeding cut. On the latest and best designed machines three hand levers and a foot operated control for the brake are all that is necessary for a crane navy and two hand levers and two brakes for a dragline or grab. These are detailed as follows:

- One lever controlling the regulator valve and hoisting clutch of the main engine.
- One for controlling the regulator and reversing motions of the slewing engines.
- One for controlling the regulator valve and reversing motion of the racking engines. (On some machines the slewing racking engines are controlled with one lever.)
- One foot pedal for controlling the brake on the digging drum for lowering the bucket.

On a Dragline and Grab the racking lever is dispensed with and a foot pedal to the hoisting drum is used in its place.

Two other levers are required on the machine, one for the travelling clutch and another for reversing the main engines in conjunction with the travelling motion, but these are only occasionally used and are not usually grouped with the three chief levers. In addition to the simple arrangement of levers described above, the digging and hoisting clutches are operated by means of a steam cylinder and the regulator valves of the hoisting, slewing and racking engines are of the piston type, all of which make for easy and quick operation.

To sum up, the modern excavator is very fast, efficient, capable of large outputs, mobile because of its caterpillar tracks and adaptable to almost all classes of excavation.

The best makes are very reliable and little trouble is experienced with breakdowns as the machine has been built up on the result of many years of actual working experience under many varied working conditions and weak places have been eliminated or strengthened.

When first introduced the modern crane navy was fitted with a 1 c.y. bucket and weighed about 30 tons. The leading makers now have a full range of machines with buckets varying in sizes from ¾ to 8 cub. yards capacity and weighing from 20 to 350 tons each. The size of the bucket, length of jib, cutting effort on the teeth and total weight all have definite relations one to the other. Thus a Crane Navy with a ¾ to 1 c.y. bucket will have a cutting effort of about 6 tons upon the bucket teeth and should weigh about 24 tons when mounted on caterpillar tracks.

It is a mistaken practice to attempt the use of a larger bucket than is warranted by the nature of the material or the available cutting effort upon the teeth, as it will only slow the working speed of the machine and result in reduced outputs.

Again the machine must not be too light, otherwise it becomes unstable and lifts up at the back before the maximum cutting effort can be exerted on the teeth.

It is also a mistaken policy to choose a machine too small for the work which has to be carried out. For instance, a small machine with a ¾ c.y. bucket, 6 tons cutting effort on the teeth and weighing about 24 tons will dig material up to fairly stiff clay. For very heavy clay, or clay with small boulders in it, a machine with 10 to 12 tons cutting effort, bucket up to 1½ c.y. capacity, and



A Small Dragline cleaning out small irrigation channels in India

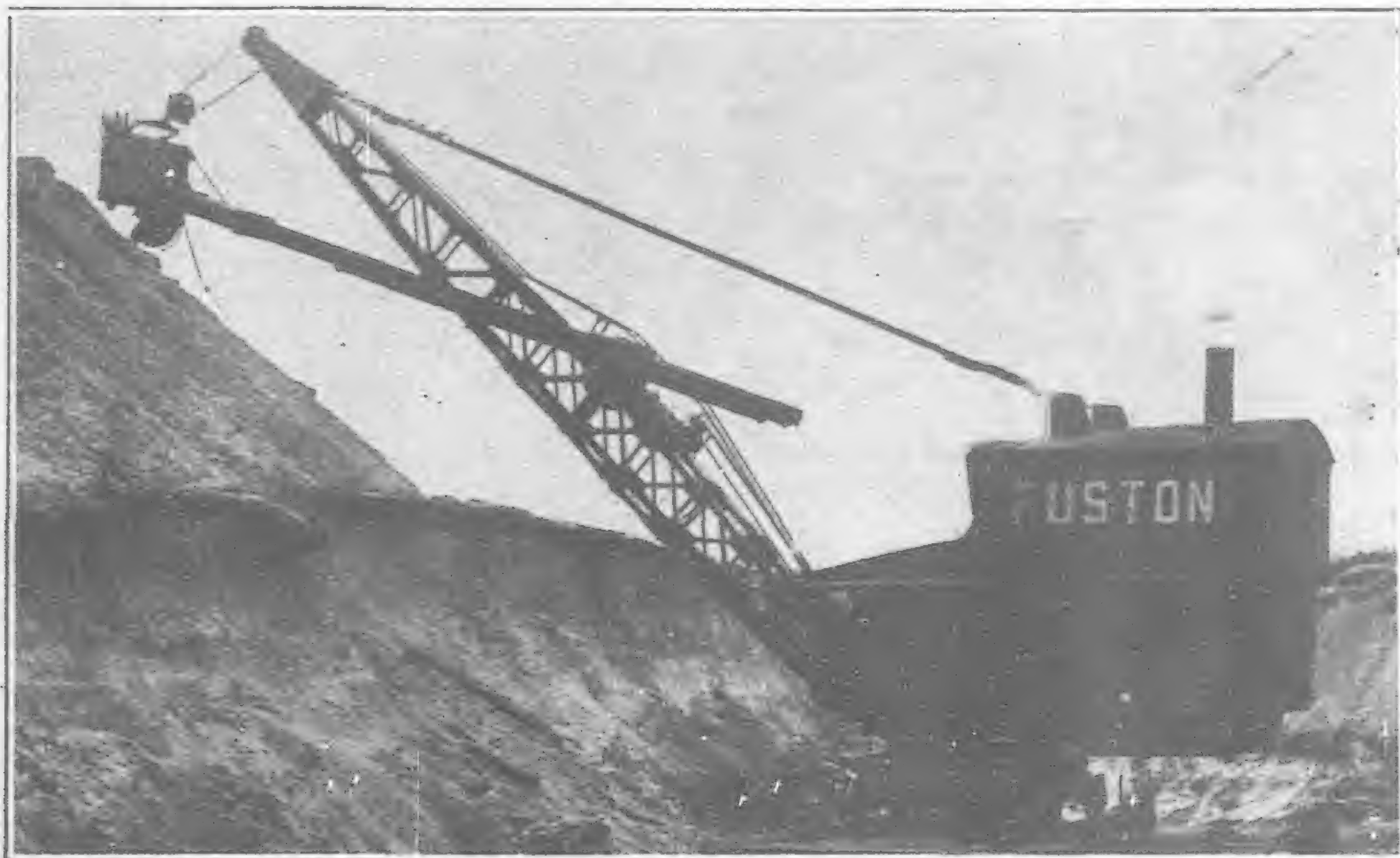
weighing about 40 tons should be used. For heavy rock work not less than 20 tons cutting effort and 2½ to 3 c.y. bucket should be employed.

The outputs obtainable will chiefly depend upon the following conditions:

- (a) nature of the material to be excavated.
- (b) size of machine and capacity of the bucket.
- (c) skill of the operator.
- (d) capacity of the wagons (when these are used to take the excavated material away) and the organization of the wagon service.

The following are fairly representative outputs under good conditions of working with various standard machines having normal jib lengths and bucket capacities.

CRANE NAVVIES.		
Capacity of Bucket.	Net weight on Caterpillar Tracks.	Approximate outputs per hour.
¾ to 1 cub. yard	24 tons	35 c.y. in clay to 70 c.y. in sand
1½ to 2 c.y.	44 tons	60 to 70 c.y. in clay to 120 c.y. in sand
2 to 2½ c.y.	60 tons	50 c.y. in blasted rock 70 c.y. in clay and 150 c.y. in sand



A long Jib Crane Navvy opening up a new quarry in England

CRANE NAVVIES.		
Capacity of Bucket.	Net weight on Caterpillar Tracks.	Approximate outputs per hour.
3 to 3½ c.y.	80 tons	70 c.y. in blasted rock 85 c.y. in clay and 200 c.y. in sand

DRAGLINES.			
Capacity of Bucket.	Length of Jib.	Weight of machine on Caterpillars.	Output per hour.
¾ c.y.	30-ft.	24 tons	30 to 50 c.y.
1¼ to 1½ c.y.	40-ft.	44 tons	50 to 80 c.y.
2½ c.y.	60-ft.	85 tons	70 to 100 c.y.
3½ c.y.	80-ft.	140 tons	100 to 150 c.y.
		on rail wheels.	
5 c.y.	100-ft.	190 tons	150 to 250 c.y.
8 c.y.	120-ft.	350 tons	250 to 400 c.y.

The cost of excavation per cubic yard varies with practically every job according to the nature of the material, the output required or obtained, the cost of labour on and around the machine, the price of fuel or current if an electrically driven machine is used and the general organization costs. Generally speaking a Crane Navvy or Dragline will carry out excavation work at from one half to one quarter that of the hand labour previously used even when the capital charges consisting of interest and depreciation are included.

Labour Required. A driver is of course essential and the greatest care should be taken in choosing him. If not a skilled driver, he should be mechanically inclined and given time to get into the working of the machine and gain speed.

A Fireman is required on a steam machine for maximum outputs but he is of course not required for an electrically operated machine and can be dispensed with on a steam machine, when only a small output is required and the driver has time to do the firing.

The number of men required around the machine varies considerably. For a rail wheel machine from 3 to 6 will be necessary (depending upon the size of the excavator), to level the ground, lay the necessary sleepers and rails in front of the machine, attend to the supply of coal and water and for cleaning up any material which may be spilled from the wagons when dumping. With a caterpillar machine only one or two men are required and sometimes for Dragline work dumping directly on to the bank even these are dispensed with, arrangements

being made to fill up with coal and water during the meal intervals.

One of the great advantages of a caterpillar machine in addition to its great mobility and saving of time travelling ahead or from one place to another, is the fact that no sleepers or rails are required and it is not necessary to level the ground previous to travelling forward for another series of cuts after the machine has dug all the material within reach.

Fuel Consumption. The coal consumption varies from 3 to 6 lbs. of coal per cub. yard of material excavated. The question is frequently asked what does it cost to excavate a cubic yard of material. As previously stated this varies with every job and no average can be given but the following is a representative example of a Crane Navvy or Dragline on Caterpillars under the conditions of labor and fuel costs as existing in England, the machine being fitted with a bucket of 1½ c.y. capacity, the material being clay excavated at the average of 600 c. yards per day.

One driver	12s. 0d. per day
One fireman	7 6 —
2 men around machine	15 — —
25 cwt. of coal	£2 2 — —
Oil, water, etc.	2 — —
Total	£4 1s. 6d. per day

which on an output of 600 c. yards=1.63 pence per cub. yard, loaded into wagons. Reckoning 6 per cent. interest, 10 per cent. depreciation and renewals on 280 working days per year, another 8 pence is added to the working costs, making a total of 2.43 pence, or in round figures 2½d. per cubic yard.

The corresponding cost of hand labor for this work was 10d. per cub. yard against 2½d. for the machine.

When the cost was taken over a month it was found the actual average cost for the machine due to various delays incidental to practically every excavation job worked out at about 3½d. per cub. yard or only one third the cost of hand labor.



A large Crane Navvy stripping iron ore in England

Even in India, and West Africa, where native labor is cheap and plentiful, it is found the excavator scores over hand labor as regards actual workings costs. The machine has further advantages, even in native states, in that much less hand labor is necessary with the accompanying troubles due to strikes and disinclination to work during bad weather, in other words, it makes the user more independent of hand labor, as well as enabling the work to be completed in a much shorter period.

So far only the Steam machine has been mentioned, but electrically operated excavators are becoming increasingly popular for certain classes of work, particularly quarries and open cut mines where cheap electric power is available. They involve the use of motors in place of the usual steam engines and the provision of an electrically operated air compressor to operate the power clutches by means of compressed air. On the medium sizes, automatic contactor gear is fitted which automatically controls the current to suit the load on the motors and gearing. With this arrangement the driver can throw his control lever over to any intermediate position and the automatic contactor gear will cause the motors to accelerate in the fastest possible time without any care on the part of the driver.

In the largest sizes, Ward Leonard Voltage Control is usually employed by means of which separate generators supply power to each of the motors used for digging and slewing and in the case of the Crane Navvy, for racking.

Either A.C. or D.C. current can be used upon the machines with equal success and altho D.C. is generally favoured, there are several places where A.C. current of 6,000 volts is carried directly on to the machine and used on the driving motors at this voltage.

Internal Combustion Engines are also being used on excavators, but their use means dispensing with separate power units as used on the latest steam and electric machines, as only one engine is used, the necessary drives to the hoisting, slewing and racking motions being taken through friction clutches as on the original steam machines before the now almost universal practice of a separate engine or motor for the three motions.

In conclusion it will be useful to mention the various classes of work for which the various types are being employed and learn what we can from them.

Dealing first with the now popular small machines fitted with $\frac{3}{4}$ to $\frac{7}{8}$ c.y. bucket. Up to comparatively recent years the small machine was not favoured, as steam navvies were only considered applicable to big contract, jobs involving huge quantities of excavation such as Railroads, Docks, Harbours, Canals and large Open Cut mines. As the cost of hand labor increased and became less controllable and more independent, the smaller firms or men looked round for something suitable for their needs which they finally discovered in the small machine which is now being applied by:

The Contractor.

- (a) For the excavation of basements for foundation work of large buildings, etc.
- (b) Clearing off and levelling ground for the erection of buildings, houses and reconstruction work.
- (c) Trench excavations.
- (d) Making new drains and canals, or cleaning out existing ones, the draglines being especially adapted to this form of excavation.
- (e) Grading new roads.
- (f) For the construction of large railways, etc.
- (g) For reservoirs, etc.

The contractor in fact finds this small universal machine one of his best investments as not only is he able to carry out his present contracts cheaper, but is able to put in cheaper tenders and undertake to do the work in a shorter time than with hand labor with the result the man with an excavator secures more work at a greater profit as the bidding is not so close as for hand labor alone, in fact the position in many countries is such that no contractor can hope to secure contracts involving excavation unless he has a small excavator at hand.

The Brickmaker is also finding the Crane Navvy type of machine just what he needs for the excavation of the clay and in some cases for the removal of his overburden.

The Quarry Owners are using the Crane Navvy for almost all kinds of quarry work including the removal of the overburden, and the Dragline for the excavation of sand and gravel from below the surface of the water.

Iron and Steel Companies, Gas Works and Power Stations

are making increasing use of the Crane Navvy and Grab for taking iron ore, coal and coke from their stock piles.

Railway Companies are also using the Crane Navvy for making new railways, widening existing ones, removing slips in cuttings, the excavation of gravel, etc., for ballast and the many small excavation jobs, which periodically crop up.

Another useful size of machine is one fitted with $1\frac{1}{2}$ c.y. bucket with about 10 tons cutting effort on the teeth. Several of the largest contractors in Great Britain including Messrs. S. Pearson & Son, Sir Robert McAlpine & Sons, Wilson Lovatts, Edmund Nuttall & Sons, Brims & Co. and Logan and Hemingway are making increasing use of the machine for their contract work as they favour its mobility, speed of working and universal features and are becoming more inclined to the use of this machine than anything larger for the majority of the contract jobs which come their way. Several of them have succeeded in obtaining an output of over 1,000 cub. yards per day with this machine which they say is usually as much as it is possible to deal with.

The Brickmakers, Quarry Owners, Iron and Steel Companies are also purchasing this machine for use when the output from the small machine is insufficient for their needs or in the case of the quarry owner where the stone or mineral is too difficult for the smaller excavator to dig.

The next two most useful sizes have 2 and 3 c.y. buckets with 15 and 20 tons cutting efforts on the teeth. Contractors are employing these for very large excavation contracts, such as railroads, docks and harbors, but the greatest use is being made of them by the Quarry Owner who is employing them for the excavation of minerals such as iron ore, copper, limestone and road stone such as granite, basalt, etc. Many hundreds of these machines are successfully handling these materials, in fact the larger machine is by far the most popular machine in Great Britain for this work, and more than double are being employed than all other sizes added together.

Cement Companies are almost all exclusively using the larger machines for excavating their limestone, chalk and clay for the manufacture of Portland Cement.

Finally we come to the largest machine of the Crane Navvy and Dragline type weighing from 90 to 320 tons in weight.

Crane Navvy or Dragline equipments are interchangeable on these machines and all of them are fitted with long jibs to meet the needs of open cut mines, big irrigation and development schemes generally and to a smaller extent the large contracts for special jobs.

The following are the leading dimensions of the usual sizes:

CRANE NAVVIES.			
Heaped & Level capacity of the Buckets.	Length of Jib.	Net weight on Railwheels.	Approximate output per hour.
2 — $2\frac{1}{2}$ c.y.	40-ft.	80 tons	{ 60 c.y. in clay 100 c.y. in sand
$2\frac{1}{2}$ — 3 c.y.	60-ft.	150 tons	{ 80 c.y. in clay 140 c.y. in sand
$3\frac{1}{2}$ — $4\frac{1}{2}$ c.y.	75-ft.	220 tons	{ 120 c.y. in clay 200 c.y. in sand
7 — 8 c.y.	90-ft.	320 tons	{ 200 c.y. in clay 350 c.y. in sand
DRAGLINES.			
2 — $2\frac{1}{4}$ c.y.	60-ft.	75 tons	{ 60 c.y. in clay 100 c.y. in sand
$2\frac{1}{2}$ — 3 c.y.	80-ft.	140 tons	{ 80 c.y. in clay 140 c.y. in sand
$3\frac{1}{2}$ — $4\frac{1}{2}$ c.y.	120-ft.	200 tons	{ 120 c.y. in clay 200 c.y. in sand
5 — 6 c.y.	150-ft.	300 tons	{ 150 c.y. in clay 280 c.y. in sand

Messrs David Brown & Sons

Messrs. David Brown & Sons (Huddersfield) Ltd., have recently published a booklet "What We Make," which briefly illustrates and describes their various standard lines of manufacture but does not attempt to deal with their exceptional facilities for the design and application of all types of gearing for power transmission.

The earlier portion of the booklet will be of interest to those who may not be acquainted with the David Brown & Sons plant and manufacturing methods, whilst the center pages give a detailed summary of the comprehensive service that is offered to users of all forms of gearing for power transmission.



A Busy Day on the Bean Wharf at Dairen

The Dairen Bean Oil Industry

THE first oil mill in Dairen, Shwang Ho Chan, located in the Chinese Quarter, or Sikangtze Section, was started in 1906. This was followed by Chung Sheng Ho and Nisshin on the Wharves in the ensuing year, Nisshin being a Japanese concern with a capital of Y.3,750,000. In 1908, Chang Pen-ching a leading shipping merchant of Manchuria, started the Chingkee Mill. In the same year, the South Manchuria Railway Company fixed the same freight rates for goods from any part of Manchuria to Dairen, Newchwang and Antung, with the object of making Dairen the trade center. Since then, oil mills in Dairen have grown in number, and Dairen has become the center for the distribution of beans and the center of export for beancakes and bean oil.

A shortage of mill hands was felt when the industry started to develop, and the competition for

men led to the organisation of the Dairen Oil Mill-Owners Association, in 1912 so as (1) to prohibit such competition, (2) to restrict the mill output, and (3) to limit the number of mills. Japanese authorities

in Dairen rendered support to the Association in not granting any land for new oil mills without the Association's concurrence. Restriction in output was enforced for a certain period of time, but the enforcement was not easily maintained. At present, any member of the Association can freely increase the output of his mill to any extent to suit his own requirements. Originally, the Association aimed at all possible means of developing the industry and protecting the mutual benefit of its members; but now, it is functioning merely to facilitate transportation and to conduct negotiations with other bodies. Since June, 1923 all mills, except seven, have joined the Association.

Among the seven non-members, only the Dairen Oil Mill Co.



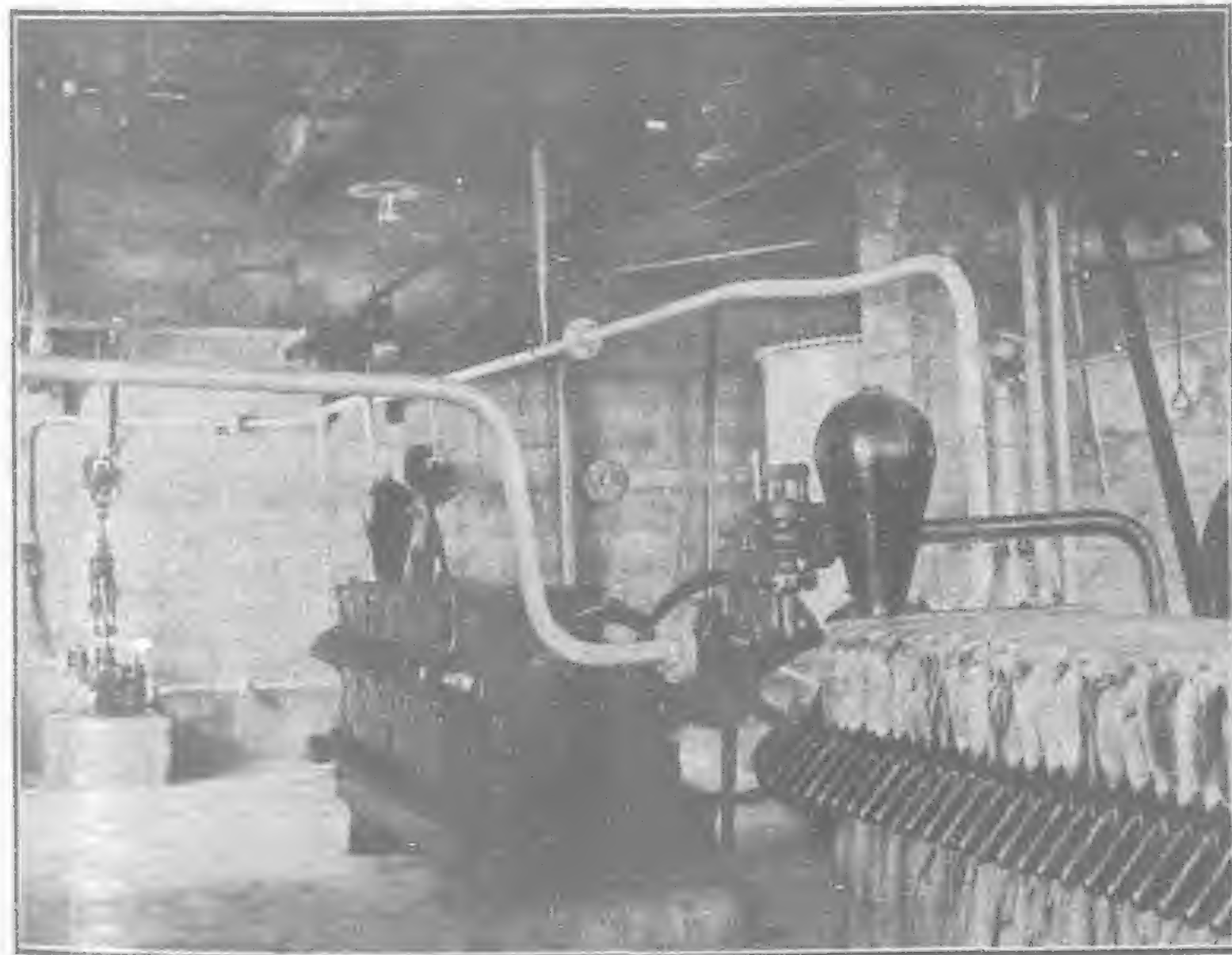
Nisshin Oil Mill, Dairen



Interior of the Nisshin Oil Mill, Dairen

and the Jih Hwa are operating regularly, while the other five operate only at irregular intervals. The actual output of the oil mills in Dairen varies a good deal with the maximum output, being subject to demand and supply and other conditions. The operating period in a year averages ten months. Of the 84 mills, only 69 are operating, 58 by Chinese and 11 by Japanese, 15 having been suspended. The industry thrived during the World War, but has somewhat declined during later years. The daily productivity of beancakes in Dairen totals 218,900 whole pieces and 299,376 catties in fragments, or powder form, of which 175,500 pieces are from Chinese mills and 43,400 pieces and 299,376 catties from Japanese mills. Total amount of oil production is 1,149,600 catties. The annual output of beancakes in 1924 totalled 26,400,000 whole pieces and 16,280,000 catties in fragments, 21,878,664 pieces from Chinese mills and 4,521,336 pieces and 16,280,000 catties from Japanese mills. Total oil production amounted to 130,849,745 catties. Oil is obtained by extraction with benzine, the most up-to-date method, only in the Susuki Mill. The other 32 mills, chiefly Japanese-owned, employ hydraulic pressure machines, while 51 Chinese mills employ hand screw presses.

Oil mills in Manchuria operating on a small scale date back nearly half a century, their output being sufficient only for local consumption. Modern mills appeared in Newchwang after the Sino-Japanese War in 1894. Newchwang was the center of the bean oil industry in Manchuria before the rise of Dairen. Mills in Newchwang have again increased during recent years, owing to the limitation of their number in Dairen. Two other important bean oil centers next to Dairen are Putung and Harbin.



The Fitter Presses

New Vessel for Pacific Islands Trade

On July 9, Messrs. Barclay, Curle & Co., Ltd., launched the single-screw motorship *Malabar*, built by them to the order of Messrs. Burns, Philp, & Co., Ltd., for their services between Australia, New Guinea and the Islands of the Pacific. The launching ceremony was performed by Mrs. James Burns from the builders' West Shipbuilding Yard at Scotstoun.

Constructed under the supervision of Mr. W. G. R. Snellgrove, the owners' superintendent engineer, the *Malabar*, whose dimensions are 350-ft. long by 48-ft. 6-in. moulded breadth, and 25-ft. 3-in. deep to the upper deck, has a gross tonnage of 4,500. She is designed to carry about 4,600 tons deadweight, and has been built under special survey to Lloyd's 100 A. 1 fig. class, in addition to which she embodies all the requirements of the British Board of Trade and Australian Navigation Act.

Accommodation is provided for 156 passengers in one, two and four berth cabins, with large airy public rooms, consisting of dining saloon, at fore end of bridge, with auxiliary dining saloon on upper deck, also smoking room and music room, while the main entrance of the bridge deck has an open balustrade well immediately above the dining saloon, and is furnished as a lounge.

All of the state room and public rooms are tastefully furnished and decorated, and the problem of keeping the rooms cool and airy has been met by the provision of mechanical ventilation on the punkah louver system. Large insulated store and provision room are provided, and part of the 'tween decks is insulated for the carriage of fruit and frozen meat.

The cargo handling arrangements are very complete, consisting of five large hatches served by 10 electric winches, and 14 derricks working on the Union purchase system. The steering gear and windlass are electrically driven, and the passenger galley range is oil-fired.

The propelling machinery which is being installed by Messrs. J. G. Kinnaid & Co., consists of one set of Burmeister and Wain type Diesel engines on the four-stroke single-acting principle, having eight cylinders, developing 2,700 b.h.p., and capable of maintaining a speed of 12 knots.

Belt Conveyor System Used by Japanese at Rock Quarry

The accompanying illustration shows a very interesting belt conveyor system in the vicinity of Ketto, Japan, where rock is being quarried from the open face of the cliff for use on the dam of the Shinyetsu Hydro-Electric Co. Through a chute at the end of the conveyor the rock is loaded and hauled, with sand from a nearby pit, in 40 cu. ft. dump cars which are drawn by electric locomotives.



Interesting Belt Conveyor System in Use in Japan—Rock is Loaded and Hauled from a Chute at End of Conveyor, with sand from Nearby Pit

The Launching of the "Taishan"

THE following are the details of the s.s. *Taishan*, the new twin-screw steamer for the Hongkong Canton and Macao Steamboat Co., Ltd. for their Hongkong-Canton service, which was launched by the Taikoo Dockyard & Engineering Co. of Hongkong, Ltd. on June 10.

Length over-all	300-ft. 6-in.
Length between perpendiculars	290-ft. 0-in.
Breadth extreme	56-ft. 2-in.
Breadth moulded	54-ft. 0-in.
Depth moulded to saloon deck	22-ft. 6-in.
Depth moulded to main deck	13-ft. 6-in.

The vessel has a double bottom fitted all fore and aft, two large cargo holds and a smaller hold specially fitted up for the carriage of silk. There are three decks, accommodation being provided on the saloon and boat decks for 49 first class passengers and 24 second class. Intermediate passengers are berthed aft on the saloon deck in a large deckhouse while the third class are carried on the main deck.

The first class passengers are accommodated in 23 single berthed cabins, 10 double-berthed cabins and two family cabins of three berths each.

Seven pairs of the single-berthed cabins are convertible into double-berthed cabins by means of a communicating door. Four of the staterooms have been specially fitted up as "Cabins de luxe," each having its own decorative scheme; private bath rooms are also attached to these cabins.

The dining saloon, which is situated forward on the saloon deck, has a height of 11-ft. and is entirely free of pillars. Particular care and attention has been given to the design of this room which is about 42-ft. square and will form a special feature of the vessel, everything having been carefully studied to give a light and airy appearance. Normally the saloon can dine 48 persons at

small tables for four persons but these tables can be extended so as to accommodate a greater number when required. The floor of the saloon is laid with teak parquetry and the corridors in the first class accommodation have been laid with rubber tiling.

On the boat deck adjoining the main entrance to the cabins, a smokeroom has been arranged and is designed in the old English style with oak beams and panelling, all the fittings being in keeping. The seats are upholstered in leather, and with the comfortable lounge chairs, card tables and other fittings which are being provided, it is bound to be a very popular room.

The captain, officers, engineers, wireless room and navigating quarters have been placed on a deck somewhat higher than the passenger deck forming a citadel, which meets all the special requirements of the Anti-Piracy Committee.

The firemen and engine room staff are housed conveniently to the engine room and "grilled off" from the main deck, so that they cannot be interfered with in the event of piracy. Electric light is

fitted throughout the vessel and numerous fans provided; hot and cold water service is laid on to all wash basins throughout the vessel.

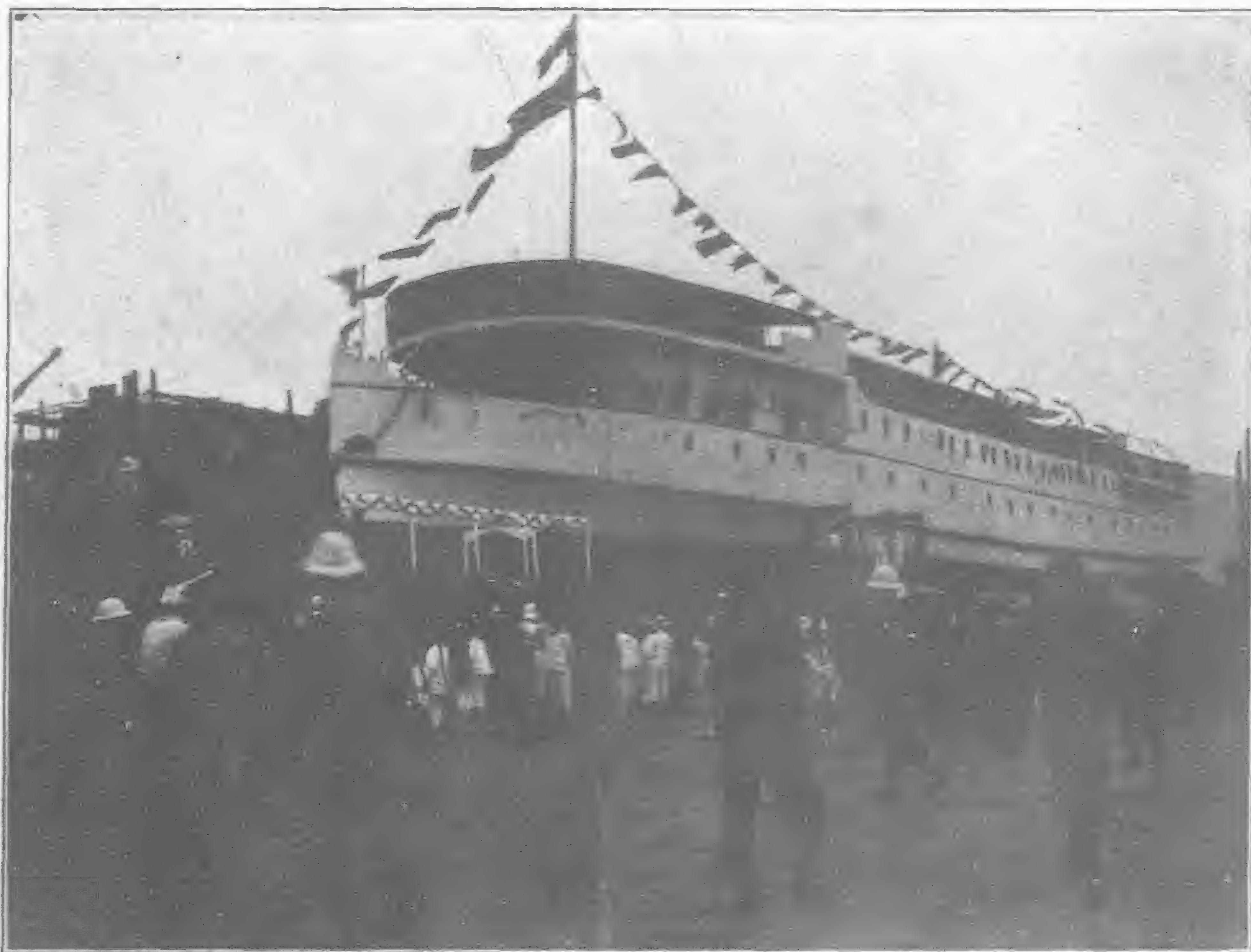
The propelling machinery consists of two sets of inverted, direct-acting surface-condensing four cylinder triple-expansion engines working on four cranks which are balanced so as to, as far as possible, eliminate vibration. The diameters of the cylinders of each set of engines are 19-in., 30-in., 35-in., 35-in. with a stroke of 27-in. and they are designed to give the vessel a speed of 15 knots when developing collectively 3,500 i.h.p. and running at about 180 revolutions per minute, but are capable of developing 4,000 i.h.p. at 200 revolutions so as to increase the speed if desired. Each engine is provided with its own condensing plant, which is kept quite independent of the engines themselves; the condensers, which are of the "Uniflux" type, being placed on brackets at the sides of the ship and each provided with its own centrifugal circulating pump and enclosed forced lubrication steam engine, and Weir's direct-acting single cylinder "Monotype" air pump. The boiler feeding arrangements include one pair of Weir's main feed pumps, one Weir's auxiliary feed pump for use in port, one Weir's direct contact type feed water heater, and two gravitation type feed

water filters. Other auxiliaries consist of two large ballast and general service pumps which are interconnected also large independent sanitary and fresh water pumps.

Steam is provided by four cylindrical, multitubular marine boilers each 15-ft. 6-in. diameter by 11-ft. 7-in. long having three "Morison" corrugated furnaces 3-ft. 10-in. internal diameter and they have been constructed in accordance with Board of Trade rules, under Hongkong Government supervision for a working pressure of 200-lbs. per sq. in. They are arranged for burning coal with provision for changing over to oil burning at a future date if desired and work under Howden's system of forced

draught. The fan for supplying air to the furnaces is of Howden's make and is driven by an enclosed forced lubrication engine. Electric power for the lights and fans is supplied by two Clarke Chapman dynamos driven by enclosed forced lubrication engines each of 12 kilowatts capacity when running at about 300 revolutions per minute. A Clarke Chapman combined direct grip windlass and capstan are fitted on deck forward for dealing with the anchor cables and warping, and a Clarke Chapman warping capstan is fitted aft. The steering gear consists of a Hastie's "Wilson Pirrie" type steering gear fitted at after end of saloon deck and controlled from bridge by means of a "McTaggart Scotts" telemotor gear.

The *Taishan* being the first vessel the Taikoo Dockyard and Engineering Co. of Hongkong, Ltd. have constructed for the Hongkong Canton and Macao Steamboat Co., Ltd., no effort has been spared to turn out a first class boat suitable in every way for the Hongkong-Canton run.



The s.s. *Taishan*, a New Hongkong, Canton and Macao Steamboat Co. Liner



New motorship "Silveray," recently launched by Messrs. Joseph L. Thompson & Sons, Ltd., for Special Trade between America and the Orient

The "Silveray" for Far Eastern Service

MESSRS. Joseph L. Thompson and Sons, Ltd., of Sunderland have just completed the *Silveray*, a finely modelled motor vessel which they have built for the Way Shipping Company Ltd. Messrs. Stanley and John Thompson Ltd., are London managers. The *Silveray* is intended for special trade between America and the Far East, and will run in conjunction with the ships of the Kerr Steamship Co., Inc., of New York.

Her overall dimensions are 412-ft. length by 57-ft. breadth (extreme) by 35-ft. 4-in. deep from the shelter decks. A topgallant forecabin is fitted about 39-ft. long by 8-ft. high; in it is accommodation for seamen, carpenter and boatswain, quartermasters, stewards, engine room assistants, etc.

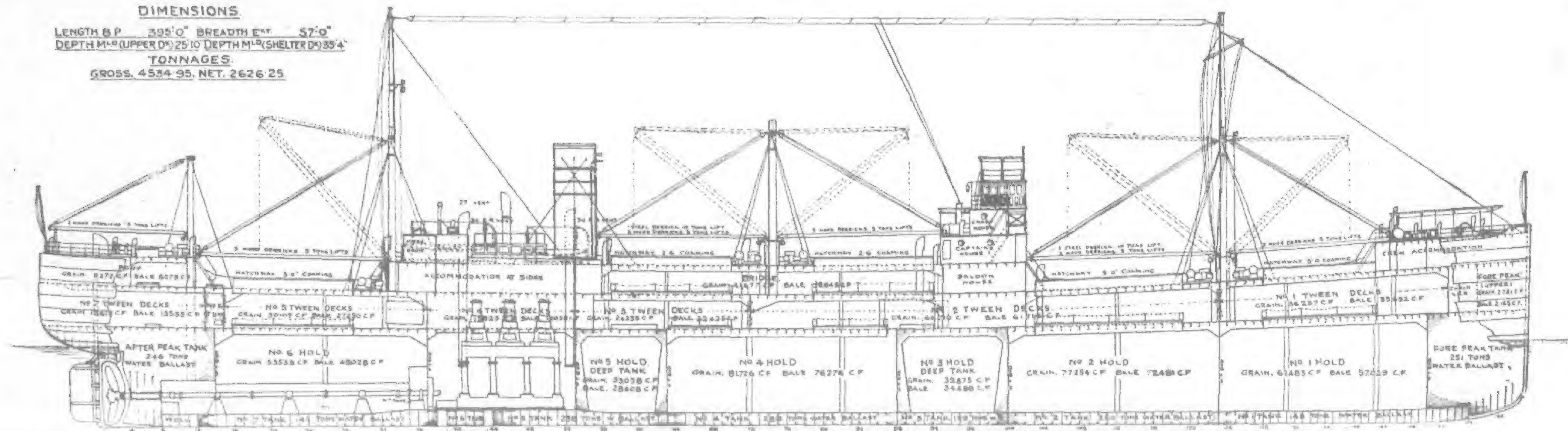
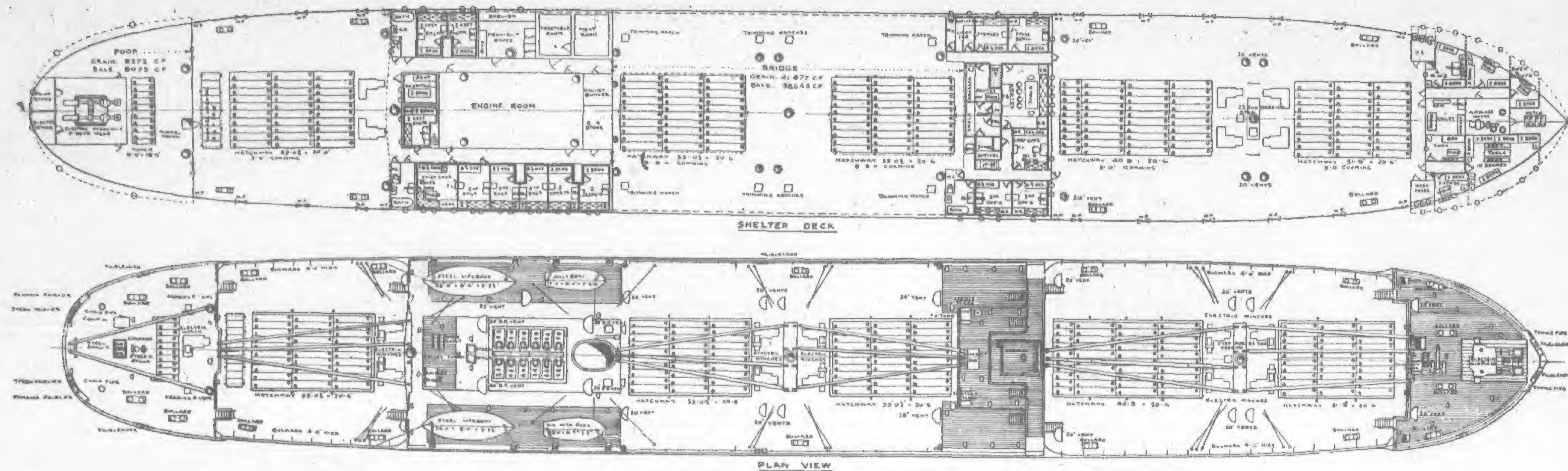
The vessel is built to Lloyd's highest class, on the single deck rules, with an open shelter deck, and will have a deadweight carrying capacity of something like 8,000 tons on a moderate draft of water. The framing system adopted is that of channel sections. There are six oil-tight and two water-tight bulkheads, in addition to four steel division bulkheads in the 'tween decks. The double bottom is built on the cellular principle, and is arranged to carry oil or water ballast right fore and aft. In addition there are two very large deep tanks also arranged for the carriage of water ballast or oil cargo. At the forward end of the vessel an exceedingly large deep tank is provided for the carriage of water ballast or oil cargo, a similar large tank being fitted at the after end. The stern is of the cruiser type. Special attention has been paid to the cargo space, the carriage of light cargoes being kept in view in designing it. The cubic capacity is, therefore, unusually large for the deadweight of the vessel.

Amidships there is a bridge 175-ft. long by 8-ft. 9-in. high, at the forward end of which is a commodious saloon, accommodation for three officers, a spare berth, stewards' pantry, stewards' rooms, etc. The whole of this accommodation has been fitted up in a much improved way, the engineers having a separate berth. Accommodation is also provided for six assistant engineers and two apprentices. There are two large insulated meat and vegetable rooms the temperature in which is regulated by a refrigerating machine installed in the engine room. The refrigerating plant has been supplied by Messrs. J. and E. Hall, of Dartford.

The poop aft is 39-ft. long, the space being partly taken up with the electro-hydraulic steering gear, and store rooms. For the captain's use there is a large roomy apartment on the top of the bridge, together with an office, and accommodation is also provided in this house for the wireless telegraph apparatus and the wireless operators. The chart-house is above the captain's house, and above this again is the wheel house. The bridges in way of this accommodation are cleaded with teak, and have teak shelters at each end. There are three lower masts of steel, the topmasts being of wood. Fifteen wood derricks and two heavy derricks of steel are fitted, the masts having large derrick houses round them, and outriggers in way of the top masts. Two steel lifeboats are carried and two smaller boats, one of which is fitted with a petrol motor.

On a motorship of this description, where the engine room and deck auxiliaries are electrically-driven, too much attention cannot be paid to the electrical installation. On the *Silveray* the work has been entrusted to the Sunderland Forge and Engineering Company, Ltd., of Sunderland, who have recently completed several very large motorship installations. The power and lighting is carried out at 220 volts D.C., and in accordance with up to date marine practice. The main generators are of the Sunderland Forge and Engineering Company's marine type, and are three in number; each has an output of 65 k.w., and it is arranged for parallel operation. They supply the current to the following auxiliaries:—

Steering gear of the electric-hydraulic four-ram type with two Sunderland Forge special marine type motors and two pumps, an electric windlass with the motor and control gear below deck, the operating hand-wheel only being on the open deck; three ten-ton worm-gear electric cargo winches, and one five-ton electric warping winch, all of Sunderland Forge manufacture, with special features for the rapid handling of light cargo. All the engine room auxiliaries are electrically driven by the Sunderland Forge special marine type motors, including the large and small compressors, the jacket water circulating pump, the ballast pump, the bilge pump, the general service pump, the auxiliary fuel pump, the clean oil fuel pump and the circulating pump for the auxiliary engine. There are also electrically driven turbine gear, a refrigerating machine, and a motor for driving the gear in the workshop.



Owners: Way Shipping Co., Ltd., London

Managers: Stanley & John Thompson Ltd., London

Engine Builders: William Duxford & Sons, Ltd., Sunderland

Shipbuilders: Joseph L. Thompson & Sons, Ltd., North Shields Shipbuilding Yard Sunderland

In the engine room, on the starboard side, adjacent to the starting platform, the main switchboard is fitted, where it can readily be seen by the engineer on watch. The heating of the accommodation is carried out on the electric system, the radiators being fitted with three heat controls. Particular attention has been paid to the cables for the steering gear. The cables to one of the motors are laid along the deck, and to the other through the tunnel. Should the main lighting fail, and in order that lighting will be always available in the engine room, a number of emergency lights have been arranged, fed from a battery which will be automatically "switched on" when the main supply fails, and "switched off" when the main supply is resumed. A stand-by oil driven dynamo is installed for port lighting purposes when the main generating plant is not in operation.

The propelling machinery is of the Doxford Standard 3-cylinder type, self contained, with lever driven scavenging pump, jacket water, sea water, lubrication oil and general service pumps, driven off the same cross-head. The bore of each cylinder is 580 m.m., and the stroke of each piston is 1,160 m.m., the engine developing 2,650 i.h.p. at 90 revolutions. The engine is a replica of that fitted into three other ships for the same owners, *Silverhelm*, *Silverfir*, and *Silvercedar*, and incorporates all the latest improvements. The spherical combustion chamber adopted in these later engines has resulted in greater fuel economy; likewise in the use of heavier grades of boiler fuel oils. It has also materially assisted in reducing liner wear to a figure applying to the best known practice. It is formed in the hollows of the two pistons, the outer edges coming closely together during the combustion period, thus shielding the cylinder surface from the high temperature of combustion. The pistons are made of ingot steel, a material well suited to maintain the high temperature at which these are desired to operate for best fuel economy.

It is now well established that the consumption in the Doxford engines obtained on test bed trials with the engines working against a Heenan and Froude water brake, are more than realized in service. In fact, the consumption in actual service, contrary to our usual practice, are less, because there is no falling off in the mechanical efficiency of the engines, if they have to be operated at less power than is covered by the contract conditions. The reason for the mechanical efficiency not being affected by the variation in power is mainly due to the engine operating on the Doxford patent solid fuel injection system, and it may be interesting to quote a few test-bed figures pertaining to this one particular engine.

While developing 2,200 s.h.p. and turning at 88 revolutions, the mechanical efficiency is 88 per cent., and the consumption on British Mexican boiler oil of .97 s.g. is .4-lbs per s.h.p. hour. The mechanical efficiency is unaffected while running on a lighter oil, such as Anglo-Persian .89, but the consumption is considerably improved, being .37-lbs per s.h.p. hour. The difference in consumption between the two fuels is mainly due to the calorific values.

Owing to the vessel having to trade for lengthy periods in Eastern climates, the air intake for the scavenging pump is led right from the boat deck through a special ventilator, so as to ensure that the engines will obtain air as cool as it is obtainable. The ventilation of the engine room has been likewise specially cared for, being provided with four 30-in. diameter ventilators.

Electric Power Development in Nagoya, Japan

The great development of electric power in the territory surrounding Nagoya, Japan, is shown by the marked increase in the number of hydroelectric power stations sanctioned by the Government. The number of sites, both operating and not operating, increased from 138 in 1914 to 937 by the end of 1923. The total capacity of these plants increased from 85,100 kilowatts to 630,764 kilowatts during the same period.

Daido Electric Power Co. Plans Expansion

A considerable increase occurred in the number of kilowatts produced in this territory; the new Oi Station of the Daido Electric Power Co., for example, having been put in operation in November, 1924, with a capacity of 43,000 kilowatts. The total development

capacity of this concern alone in the Nagoya district reached 154,800 k.w. in 1924, and it is making preparations for still greater exploitation of water power in this territory. Its allied company, the Toho Electric Power Co., has now under way in Nagoya the construction of a steam power plant which will develop 50,000 shaft h.p. A very large steam turbine generator has been ordered for this plant from an American manufacturer.

The great development of electric power in the Nagoya district, in addition to being used locally, is drawn upon by the great industrial centers of Osaka and Tokyo. It is also believed that this power will be utilized very largely to supply the current required for the electrification of the Government railways on the



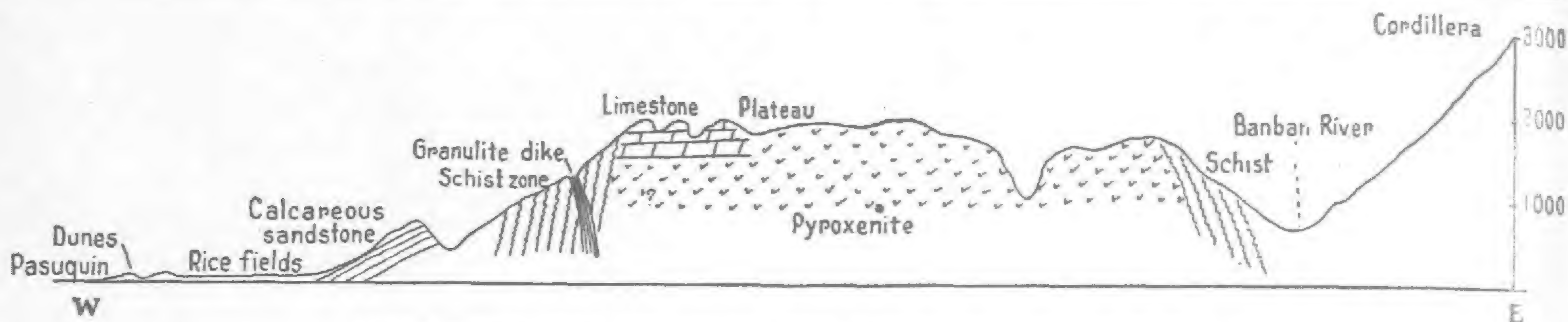
G. E. Mazda Lamps used in Lighting the City of Nagoya

Tokaido line. Furthermore, these plants will play a large part in Japan's superpower scheme which is at present under discussion.

Rural Electrification

A very practical development is the experimenting that has been done in this district and elsewhere in Japan during the past two years in connection with the application of electricity to agriculture. This work has been carried on with the support of the prefectural governments and the encouragement of the Farm Electrification Society. In view of the availability of electric power in this district and its comparative cheapness, it seems probable that it will eventually attain widespread use, especially for irrigation and drainage. The Toho Co., is doing a good deal of propaganda work to popularize this movement.

American manufacturers have in the past received large orders from this district and they will undoubtedly be called upon in the future to supply a large share of the great quantity of electrical machinery and equipment that will eventually be required.



Idealized geologic section from Pasuquin, Ilocos Norte Province, Luzon, northeast to cordillera.

Asbestos in the Philippines

HERE was a very encouraging output of asbestos in 1919, but during 1920 mining operations on the old Dungon-Dungon estate in Ilocos Norte ceased, and so the production for that year is less than for the previous one. The Ilocos Asbestos Products Company evidently has found the undertaking too expensive for its limited capital. This company has a factory in Manila where it has turned out some valuable products in the nature of roofing material, pipe lagging, etc., and it is to be hoped that it will resume operations. The asbestos that has been mined has been largely of second and third grades, but some very fair specimens of chrysotile, as much as 2.5 centimeters in width, have been found.

For more than fifteen years the presence of asbestos in Ilocos Norte has been known. The district was first reported upon geologically by Smith, in 1907 (558). After this date nothing more than brief mention of the district has appeared in the literature, with the result that little is known concerning the progress of asbestos mining in Ilocos Norte. I was detailed in March, 1921, to make an investigation of the asbestos property in the Dungon-Dungon district and to report on the progress of operations. At the time of the inspection, no asbestos was being mined.

Topography.—Many of the hills on the Dungon-Dungon estate are barren, except those capped by limestone, which always support vegetation. The slumped-off topography of serpentine areas is especially noticeable. This section of the country is maturely dissected, and Baruyen River apparently is a rejuvenated stream, as indicated by its many entrenched meanders. The coastal valleys are flat and fertile. Cape Bojeador, near Dungon-Dungon, is volcanic and decidedly wild and rugged.

Because of the topography, the roads in the district are hilly. At present, the roads on the Dungon-Dungon estate, which were not well constructed, are in very poor condition. They can be used by bull carts only, provided these carry no more than 150 to 200 kilograms as far as the main Government road, and then no more than 300 kilograms. During the rainy season the roads are impassable.

Banguì Bay is an open roadstead and not a satisfactory anchorage; although the waters may be calm to-day, the seas to-morrow may run high. The bay might be a safe harbor during the southwest monsoon. The nearest satisfactory port is that of Diriqui, 26 kilometers from Dungon-Dungon.

Geology.—The Dungon-Dungon district of Ilocos Norte is essentially one of metamorphism; namely, formation of schists, serpentinization, and amphibolization. Resting unconformably on the schists is limestone of Malubang (Pliocene) age; Baruyen River has cut a deep canon in this formation.

An idealized profile along a northwest-southeast line through Dungon-Dungon (fig. 19) shows the general field relations of the

formations existing on the Dungon-Dungon property. There is no reliable map of the district.

Origin and occurrence of asbestos.—The asbestos on the property in the Dungon-Dungon district is thought to have been derived from pyroxenites through processes of serpentinization and amphibolization, for both chrysotile veins and tremolite and actinolite veins are known to exist.

Mining Methods.—The mining of asbestos on the Ilocos Asbestos Products Company's property, near Dungon-Dungon, is entirely by open cuts, where the minerals occur in pockets or ramifying veins. The largest working—nothing more than a good prospect—is the Bed Creek mine, which has produced in the last two years 300 tons of asbestos. The Hill Top mine is the next largest; in the same period it has produced 50 tons of amphibole. Various scattered outcrops of serpentine have netted about 5 tons.

The material is loosened by hand and by blasting. The asbestos is chopped out by hand from the serpentine; waste is dumped by barrows; the fiber-bearing rock is placed in a shed, separated from its matrix by hand, and the fibre itself is placed in sacks (25 to 30 kilograms) or baskets. The sacks of fibre are carried by bull carts to Diriqui for shipment to Manila.

Amphibole is mined for about 20 pesos a ton. The cost of mining and cleaning chrysotile (crude extraction) in commercial quantity by this method would be extremely high, if not prohibitive. Transportation from the property of Diriqui amounts to from 7 to 9 pesos a ton; and from Diriqui to Manila the last shipment averaged about 22 pesos a ton.

It will be seen that the methods of mining are primitive and, in the long run, expensive. This company should have passed the prospecting stage some years ago and to-day should have some fairly well-developed mines.

Labor is cheap, but poor in quality. Up to 80 centavos a day is paid to the laborers and, in order to get sufficient help, women must be relied upon; according to Mr. Vittali, the manager, they are as good workers as the men. He also states that his experience shows the principal causes of the unreliability of the laborers to be lack of time for mining (most of them being small land owners), lack of endurance, and lack of regular application to work.

Transportation of the fibre is, as has been mentioned, by bull carts. A cart can make the trip to Diriqui in about two days. Travel on the Government road is difficult because of numerous and steep hills. There is plenty of good road metal in the vicinity, so that the construction of a good highway is possible.

Other localities.—Asbestos is reported to occur also in Zambales and in Antique. The Zambales deposit is near Subic, within the Army and Navy reservation. Samples submitted by prospectors are identified as amphibole and chrysotile. A detailed examination of the Antique deposit has not been made.



Where Asbestos is found in the Philippines

The New s.s. "Changte"

THE *Changte*, which was built by the Hongkong and Whangpao Dock Co., Ltd., and was recently launched, is a Steel Single Screw Steamer having the following dimensions:—

Length Overall	..	..	366-ft. 6-in.
Length B. P.	..	..	350-ft. 0-in.
Breadth Mld.	..	..	48-ft. 0-in.
Depth Mld. to Upper Deck	..	..	26-ft. 0-in.

and is designed to carry 4,000 tons deadweight on a mean draft of 23-ft.

The vessel is of the two 'deck type with poop and bridge combined, top gallant forecastle, promenade deck, and boat decks aft and amidships. She is constructed to Lloyd's requirements under special survey for their highest class, and fitted out to satisfy full requirements of Australian Navigation Act as regards Life Saving apparatus and equipment. Australian Fire Regulations, and to comply with Hongkong Board of Trade requirements for a passenger vessel carrying passengers including Board of Trade convention rules for Passenger vessels as applied by the Hongkong Government. The forward hold and 'tween decks are insulated for the carriage of frozen meat and chilled produce and Nos. 3 'tween decks for frozen and chilled produce and ship's stores, total capacity being 49,000 cubic feet.

The Refrigeration being Ammonia Brine Pipe system two machines are installed by Messrs. Haslem Foundry and Engineering, Co., Ltd. Derby, England. Cargo is carried in the forward and after holds and 'tween decks. The facilities for working cargo are, four derricks and four winches fitted each to Nos. 1 and 2 hatches and two derricks and two winches each to Nos. 3 and 4 hatches—winches are of the double acting Cyclops type by Messrs. Clarke, Chapman & Co., Ltd. Water ballast or fresh water is carried in the peaks while the double bottom is suitable for oil fuel as well as ballast. Oil fuel is also carried in a cross deep tank situated forward and sides of the boiler room.

The rudder is controlled from the bridge by telemotor gear which is led to Hastie's vertical combined steam and hand steering gear situated in house on poop deck and directly connected to rudder head.

A powerful Clarke, Chapman windlass is fitted for working the anchor and cables.

The ship has accommodation amidships for forty first class passengers in single and two berth cabins, fitted with all the latest conveniences with a direct supply of water, electric fans and heaters.

The vestibule is at the fore end of the bridge deck; directly under the lounge, contains the Purser's Office.

The decoration is of Georgina influence, the panelling being of teak painted ivory. At the fore end is a niche in which is placed a writing desk for the convenience of passengers. The ship's library is forward end of the Purser's Office. The main staircase and wrought iron balustrade with mahoganised teak handrail, blends with the general scheme.

Opening off the vestibule at the fore end are two cabin de luxe suites each consisting of stateroom, sitting room and bathroom.

The staterooms have been treated in the Louis XVI style, the panels being painted grey, and the styles and rails a deeper shade of the same colour.

There is a double wardrobe with mirror front, and ample hanging and drawer space, also a table which serves either as a

writing desk or a dressing table. The two comfortable "Silverex" beds invite slumber.

Adjoining each stateroom is the private bathroom.

The sitting rooms are Georgian in treatment and doors communicate with the stateroom and vestibule.

A roomy chesterfield sofa, easy chairs and a table, furnish these rooms and there is also a cupboard which can be used as a wardrobe.

The public rooms consist of dining saloon, music room, smoke room and verandah cafe.

The dining saloon is 46-ft. by 26-ft. and is at the forward end of the bridge 'tween decks, it is decorated in restrained Georgian style, and painted a delicate blue, the beamed ceiling being a soft cream colour.

There are eighteen large sidelights providing excellent ventilation and light, and there is seating accommodation for 56 persons.

Chairs, tables and sideboards, etc., are all of teak stained walnut colour and French polished.

At the after end are the service and entrance doors, and the main staircase leading up to the vestibule and the lounge above.

The polished teak parquet deck with its brown carpet runners help to complete a restful and pleasing scheme of treatment.

The music room and lounge is 34-ft. by 23-ft. and 10-ft. high

and situated at the forward end of the promenade deck is of Louis XVI influence, and has been designed primarily as a ladies' room. Its twelve large casement windows give ample lighting and the electric light fittings ensure highly satisfactory illumination at night.

The room is furnished with card-tables, writing tables and easy chairs, and a Collard and Collard grand piano.

The teak parquet deck makes an excellent dance floor, and

will undoubtedly be popular with the passengers.

The general colour scheme of ivory, rose and grey, with a touch of gilt in the staircase and the gilt mirror at the after end, give to this room a bright but restful atmosphere.

The smoke room situated at the after end of the promenade deck is panelled with English oak in the Tudor style; the beamed ceiling being in keeping with the period. There is a staircase leading from this room down to the first class staterooms. The room being furnished with four card tables with black "Vitrolite" tops, two writing tables, and four large easy chairs.

The eight large casement windows excellently light the room, and there are sufficient electric fans to keep it cool on the hottest of days.

Accommodation is provided for thirty second class passengers in the poop 'tween decks in two berth cabins, with public rooms, dining saloon, smoke room and ladies lounge.

The dining saloon is neatly panelled in teak, frame work painted white, with large panels in pale cream, there are eight small square tables with four chairs to each suitably arranged. A large sideboard is fitted at aft end, and a buffet at the forward end these are of teak stained walnut colour and French polished. There are thirteen second class staterooms in close proximity, including seven—two berth and six—three berth, each fitted with white enamel cot bedsteads, open type wash basins, direct supply and with white "Vitrolite" back and shelf, mirror, and cabinet over, large wardrobe, folding chairs, racks and ample hat and coat hooks.

The second class smoke room, entrance and ladies room are situated in a steel house on poop deck aft, the smoke room and



The s.s. Changte

entrance neatly panelled and finished in fumed oak and fitted with writing table, card tables and comfortable chairs.

A double stairway from entrance leads down to dining saloon. The ladies room, daintily panelled in maple and French polished, is arranged with tables and cosy chairs.

Accommodation is also provided for twenty-six second class Chinese passengers in bridge 'tween decks.

Space is also provided for 192 deck passengers in forecastle and lower 'tween decks forward. The Captain, officers and engineers are accommodated in houses on the boat deck amidships.

Crew are berthed in forecastle and after end of poop.

The culinary arrangements are in accordance with the latest practice, refrigerated provision rooms and ice machines, etc., being provided.

There is also installed an electrically driven steam laundry plant.

The vessel is electrically lighted throughout and fans are provided in all public, passenger and officers' rooms.

The emergency lighting set is on the boat deck.

Heating (electric and steam) is also installed to provide additional comfort in winter.

The propelling machinery constructed by the builders is placed amidships and consists of one set of triple expansion surface condensing three crank engines having cylinders 27-in. 46-in. 77-in. by 48-in. stroke.

Steam at 200 lbs. per square inch working pressure is generated in three single ended Scotch boilers working under Howden's system of forced draught. The boilers are 16-ft. diam. by 12-ft. long and are fitted for burning coal and/or oil fuel with the Wallsend Howden system of liquid fuel burning centre firing type.

A Michell Thrust Block of the latest type is fitted.

The engine room and boiler room auxiliaries are all of British make and of the latest type, and include two independent feed pumps and direct contact feed heater, one general service pump and evaporator, one independent circulating pump, one 2,000 gallons distiller together with the following pumps, one sanitary, one ballast, one fresh water and one deck fire pump, an auxiliary condenser with a separate circulating pump is fitted, all pumps have brass water ends with removeable gunmetal liners.

The oil fuel unit consists of a duplex set of pump heaters, filters, etc., of the Wallsend Howden system together with two transfer pumps. All oil fuel tanks are fitted with "Teledip" tank indicators. In the event of burning coal a Crompton's self tipping ash hoist has been installed.

On the official trial carried out, a mean speed of 14.77 knots on a mean draft of 15-ft. 3 $\frac{1}{4}$ -in. was obtained over the admiralty three mile course at Aberdeen, Hongkong, i.h.p. being 4,090 at 90 rev. per min

New Orient Liner—The "Otranto"

ON June 9 Messrs. Vicker's Naval Construction Works, Barrow, launched the steamer *Otranto* built to the order of the Orient Line. She is a 20,000 ton vessel, 658 feet long, 75 feet beam and is the third vessel of a similar tonnage added to the Orient fleet within the year. The others the *Orama* and *Oronsay* have already found great favor with the travelling public as fine seaboats. The *Otranto* will carry two classes of passengers only, and will accommodate approximately 600 first class and 1,200 third class. She will be propelled by twin screws driven by two sets of Parson's turbines, capable of developing 20,000 h.p. She will burn oil fuel.

A special feature is the ample dimensions of the public rooms, lounges, smoke rooms, etc., a provision much appreciated by travellers. A very large proportion of the rooms are for one passenger only. Third class passengers will find the *Otranto's* cabins, public rooms and deck spaces little, if anything, below the standard of second saloon accommodation of a few years back.

Apart from the value of these additions to the Orient fleet the three vessels named are notable additions to the mercantile marine of the British Empire, and would be of immense value in the event of war.

The first-class dining saloon has seating accommodation for 260 passengers, while 50 more can dine in the foyer forward of the main saloon, all at small tables arranged for from two to eight people. The saloon is 72-ft. long and extends the full width of the ship. A light and airy spaciousness is achieved by the addition of a large well in the deck space above; wide pilasters running up the full height support the central portion, and have panels of classic figures in bronze in between. The room is designed in a

free English classic manner, and carried out in tones of grey and cream. The foyer is designed in character with the dining room, so that it can be used on occasion as an additional dining space, the total seating accommodation being over 300.

The reading and writing room is 32-ft. long and 48-ft. wide having large bow windows on each side. It is decorated in Chinese style in the English manner, the walls being in tones of blue and gold with lacquer panels of Chinese subjects. The cafe at the head of the after stairway is 39-ft. long by 44-ft. wide and acts as something between a dining saloon and a lounge. Here one can obtain light refreshments or find a place of shelter screened from wind and weather. This room is panelled in cedar en suite with the smoking room, the ceiling is of Chinese vermilion with beams of cedar. The bow windows form a distinctive feature of the cafe.

The first class smoking room adjoins the cafe. It is 38-ft. long by 40-ft. wide with bow windows on each side and a raised coach roof over the central portion. It is beautifully panelled in unpolished cedar. The touches of gilt and the carvings to the pilasters and cornices give it a rich and imposing appearance. The lounge is an exceptionally large room, 104-ft. long by 48-ft. wide, and had projecting bow windows, port and starboard, having also a raised coach roof over the forward half. The decoration here is also in the English manner, with large panels in grey blue scheme of color, with columns and pilasters of yellowish scaglioli and ornaments in silver gilt. The dining saloon for the use of third class accommodation extends for a length of about 70-ft. across the whole width of the vessel. In addition there is a lounge and smoking room 24-ft. and 33-ft. long respectively.

There are seven cargo hatches, arranged three forward and four aft. These are served by 19 cargo derricks, which are carried by 2 masts and 6 derrick posts placed suitably in regard to the hatchways. For serving the derricks 16 cargo winches are provided, all of which are electrically driven.

Lifeboat accommodation is supplied for every person on the vessel. There is a total of 37 boats, of which two are motor driven and fitted with wireless equipment. Electric boat winches are fitted for working the davits, thus insuring speed and efficiency if emergency arises. All the boats are stowed at such a height above the deck that a clear space is provided out to the ship's side rails.

Ventilation has received the most thorough consideration and all the most modern methods have been brought into use. The Thermotank company's patent "Punkah Louvre" system has been installed practically throughout in addition to other mechanical and natural means. Hot and cold water services, both fresh and salt, have been provided for the convenience of all passengers and the ship's complement.

The vessel is to be propelled by twin screws driven by two sets of Parsons' turbines and single reduction gearing, each set comprising one high pressure, one intermediate and one low pressure turbine, working in series and driving separate pinions engaging with the main gear wheel. The high pressure turbine is of the impulse reaction type, while the remainder of this turbine comprises four expansions of reaction blading. The intermediate pressure is of the reaction type. The first stage of the h.p. astern turbine is incorporated in the l.p. casing. All turbines run at 1,372 r.p.m., while the propellers run at 85 r.p.m. The total shaft horse-power developed is about 20,000. When running astern the power developed is approximately 70 per cent. of the ahead power. The turbines are connected by flexible couplings to nickel steel pinions which engage with the main wheels on the propeller shafts, the gearing is of the double helical type, the main wheels consisting of cast iron centre parts with forged steel rings shrunk on.

The steam generating installation consists of six double-ended and four single-ended boilers of the ordinary multitubular return tube type, arranged in two compartments working under Howden's system of forced draught, and designed for a working pressure of 215-lbs. per square inch. All the boilers are 16-ft. 6-in. mean diameters, while the length of the double-ended boilers is 22-ft. and that of the single-ended 11-ft. 3-in. Each double-ended boiler is fitted with 8 separate furnaces of the Morison suspension type and has eight combustion chambers, the single-ended boilers have four furnaces and the same number of separate combustion chambers. The total heating surface is 50,544, square feet.

The furnaces are arranged for oil burning only; the Wallsend-Howden oil burning system is installed with two main sets of pumping and heating plant, comprising electrically driven pumps and one small steam driven oil fuel pump for harbour duty.

The New B.A.T. Building in Shanghai

THE British-American Tobacco Co., (China) Ltd., returned to their remodelled home at the corner of Museum and Soochow Roads, Shanghai.

The original structure was erected in 1907 for Messrs. Mustard & Co., who now re-occupy the ground floor. It was a building typical of the type erected at that period in Shanghai's transitional develop-

ment and served in the major part as a godown. The expansion of the British-American Tobacco Co.'s interests at last demanded the use of the whole space for executive purposes, and the remodelling of the structure to render it as suitable as possible for offices was commenced toward the end of June last year, and but for the delays rendered inevitable during the local war last autumn, and the present unrest, the scheme would have been completed within the year.

Many Alterations Needed

The old building itself was stable, but in the course of its life settlements had occurred and countless structural alterations had been effected, so that the task of the architects was not an easy one to render the block modern in effect without entirely rebuilding, which was not desired. The difficulty of meeting the up-to-date requirements of the Shanghai Municipal Council was great, especially as an additional floor was required, but by putting the new floor within a Mansard roof, and installing a sprinkler fire protection system throughout, it was possible to put the scheme in hand.

Elevationally the main lines and proportions were obviously dictated by the old building. Entirely new elevations to the road fronts with a distinct Italian feeling carried out in red and buff granite plaster and colored cement, in place of the grey granite plaster now so common in Shanghai, mark this very attractive building as a new and distinct feature here.

Reinforced concrete has been employed in the rebuilt western end, in the ground floor street fronts, in the light courts, and the cornice which bonds the whole fabric, while structural steel has been employed for the roof.

Internally all office and showroom areas are devoid of decoration, but the entrance halls, landings and staircases are treated classically with black and white ceramic mosaic floors, panelled and coffered ceilings and the walls covered to dado height with dull glazed tiles with a Sienna marble effect. The principal staircase itself is finished with white marble Terrazzo, marble newels to the lower floors, and balustrade in black iron with bronzed enrichments.

All grilles, door panels, etc., are of bronze, and all joinery is teak.

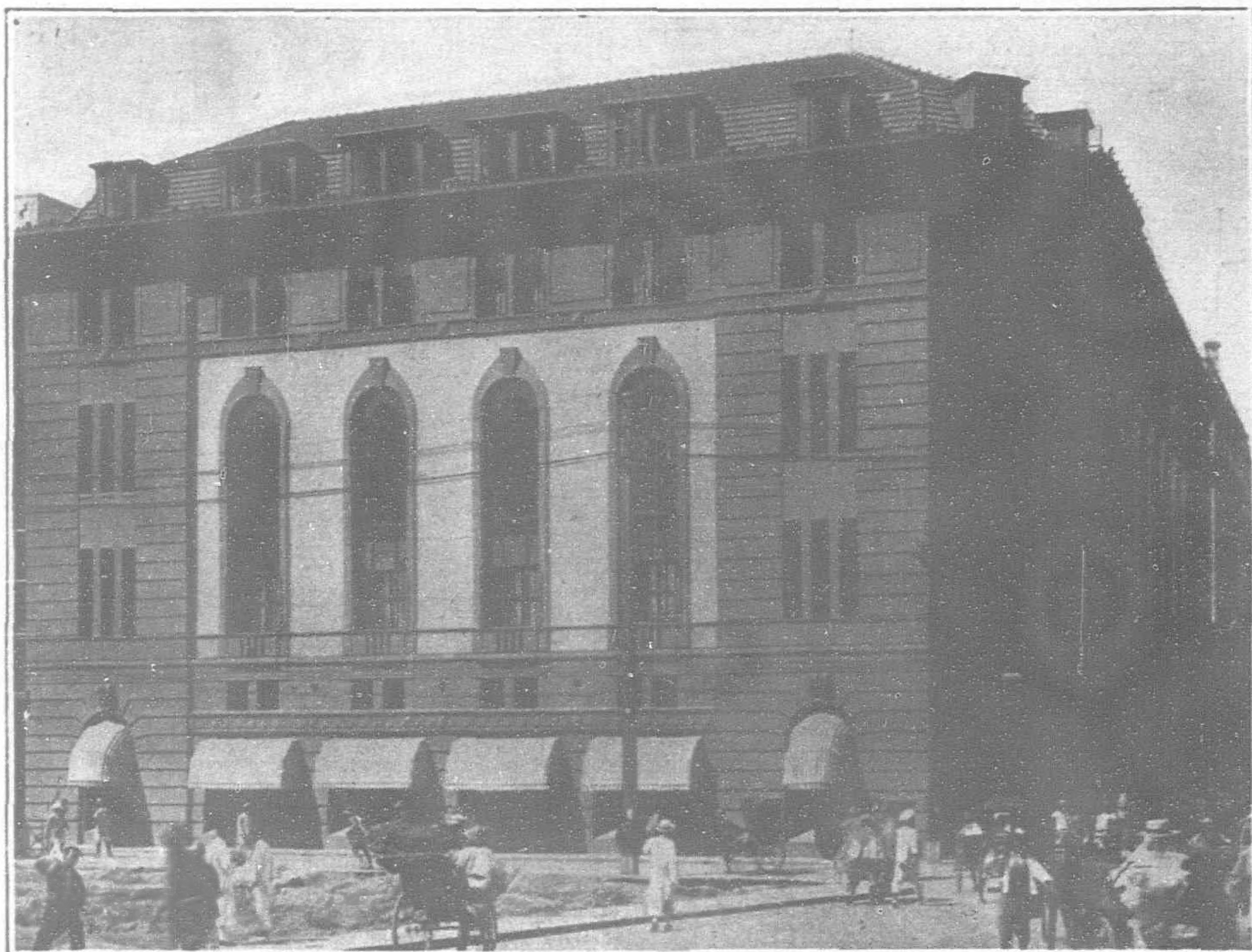
A large strong room is provided on each floor, and the most modern sanitary appliances are installed throughout. The heating medium is steam.

The Different Floors

Ten of the 11 large ground floor show windows and the majority of the ground floor space are available to Messrs. Mustard & Co., and the position of their old entrance to the building is unchanged. The principal entrance for the British-American Tobacco Co., is at the western end of the Soochow Road front, the ground floor containing the comprador's office, stationery department and mailing

room. The accounting department is on the first floor, sales departments on the second, while the third is devoted to administration, and the top floor to the advertising and supply departments.

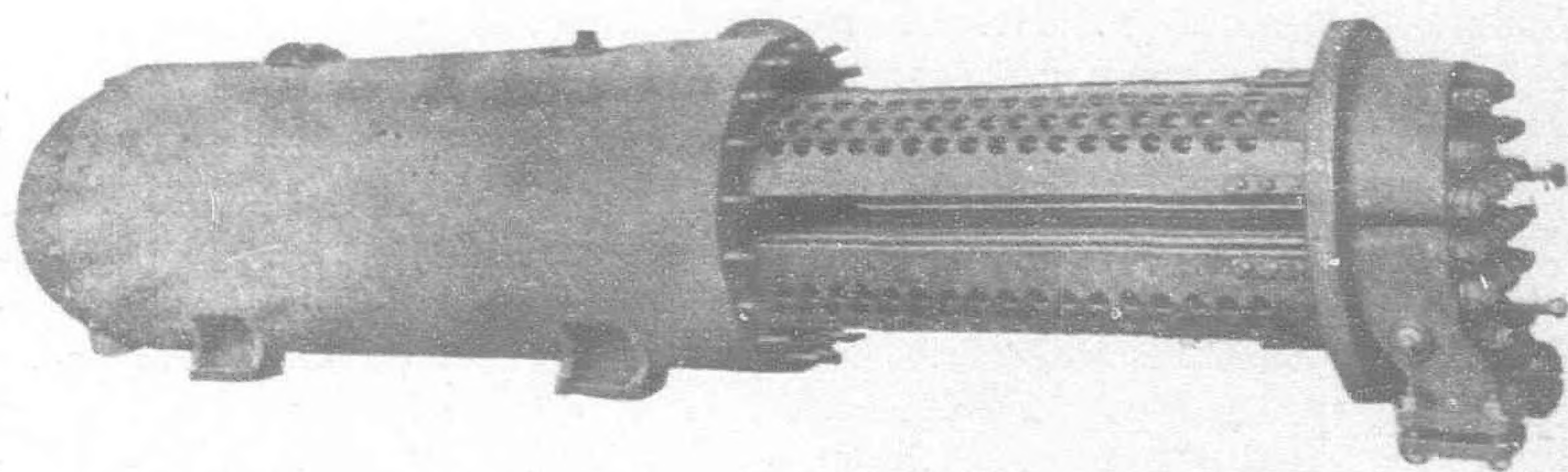
The architects for the building were Messrs. Algar & Co., Ltd., the undertaking being the work of Mr. John W. Wilson, L.R.I.B.A., A.M.T.P.I., of this firm and the following were associated in the capacities mentioned:—Messrs. Sing Jin Kee & Co., general building contractors; Messrs. J. E. Hayes Engineering Corp., structural engineering; Mr. G. S. Jensen, Waygood Otis lifts; Messrs. Crittall Mfg. Co., steel casements and bronze work; Messrs. Mustard & Co., Inc. Strong room doors, locks and furniture; Shanghai Waterworks Co., Ltd., heating, plumbing, etc., General Electric Co. of China, Ltd., electrical installations; Messrs. Mather & Platt, Ltd., sprinkler system; Messrs. Pilkington Bros., Ltd., glass; Messrs. Duncan & Co., tiles and Hope's lantern lights; Mr. N. Belanovsky, Clerk of Works.



B. A. T's. Remodelled Office Building

Locomotive Feed Water Heaters

The Superheater Company of New York and Chicago have just issued a new Catalog describing and illustrating the theory, construction and application of Elesco Non-Contact type of Locomotive Feed Water Heater. This catalog is a treatise on steam production and its utilization in locomotives. With the aid of diagrams accompanied by text, the increase in efficiency of the locomotive through the application of a feed water heater, is explained and what this amounts to in actual dollars and cents under varying conditions. The latest designs are illustrated and many typical installations are shown. 24 pages and cover. 8½-in. by 11-in. Copies of the Catalog may be secured on application to The Superheater Company.



The Elesco Heater Showing Tubes Partially Withdrawn

Tubes and Tube Plates are so Fabricated as to Form a Bundle Which Slides In and Out of Heater Body and Provides for Easy Maintenance and Repairs. When Heavy Repairs on the Tube Bundle are Necessary, the Bundle May be Replaced by a Spare Without Keeping the Locomotive out of Service.

The Diesel Engine in Far Eastern Vessels

THE increase of Diesel engines in Far Eastern shipping is becoming more noticeable as Japanese and other Far Eastern shipbuilders turn out oil burning vessels. Three vessels ordered some time ago by the Osaka Shosen Kaisha for their regular service between Japan and South America can hardly be classed as small passenger vessels. They are 430-ft. in length, with a beam of 56-ft. and a depth of 36-ft., and have a large amount of passenger accommodation, in addition to which they carry 6,800 tons.

They are all being built at the Mitsubishi Dockyard, and one is to be fitted with the first Japanese-built Sulzer engine. The machinery for the other two will be constructed by Sulzers in their Winterthur Works. In each case twinscrew plants totaling 4,600 b.h.p. will be installed. The auxiliary machinery in these vessels is of particular interest. Four 250 b.h.p. airless-injection Diesel engines will be fitted, and this will represent the biggest installation of any such plant yet made on a motor ship. The engines are of the new type developed by Sulzers, and compete in price and weight with semi-Diesel motors.

There will be launched in the near future the first of two mixed cargo and passenger ships ordered by the Koninklijke Paketvaart Mij., of Amsterdam, for their regular passenger and cargo service from Deli to Singapore and south of China. The hull is designed to carry a very considerable number of deck passengers, both forward and aft (the machinery being amidships), and the necessary arrangements are made in the 'tween decks.

There are four cargo holds, two forward and two aft of the engine room, while a peculiarity in the design is that the double bottom is not utilized for carrying fuel oil, but fresh water, of which so large a quantity is required when a considerable number of deck passengers are carried. A special deep tank is located forward of the machinery space and comparatively small lubricating oil tanks are arranged in the double bottom under the engine.

Use Electricity

Amidships on the awning deck is accommodation for sixteen first-class passengers in two-berth cabins, and thirty second-class in three-berth cabins, while on the other deck below are a few more passenger cabins. The first and second class dining saloons are located on the awning deck, the former at the forward end of the accommodation and the latter aft.

In the first ship, named the *Op Ten Noort*, which is being built by the Netherland Shipbuilding Company, Werkspoor four-cycle single-acting machinery will be fitted. There will be two motors of the six cylinder design, each developing 2,330 i.h.p.

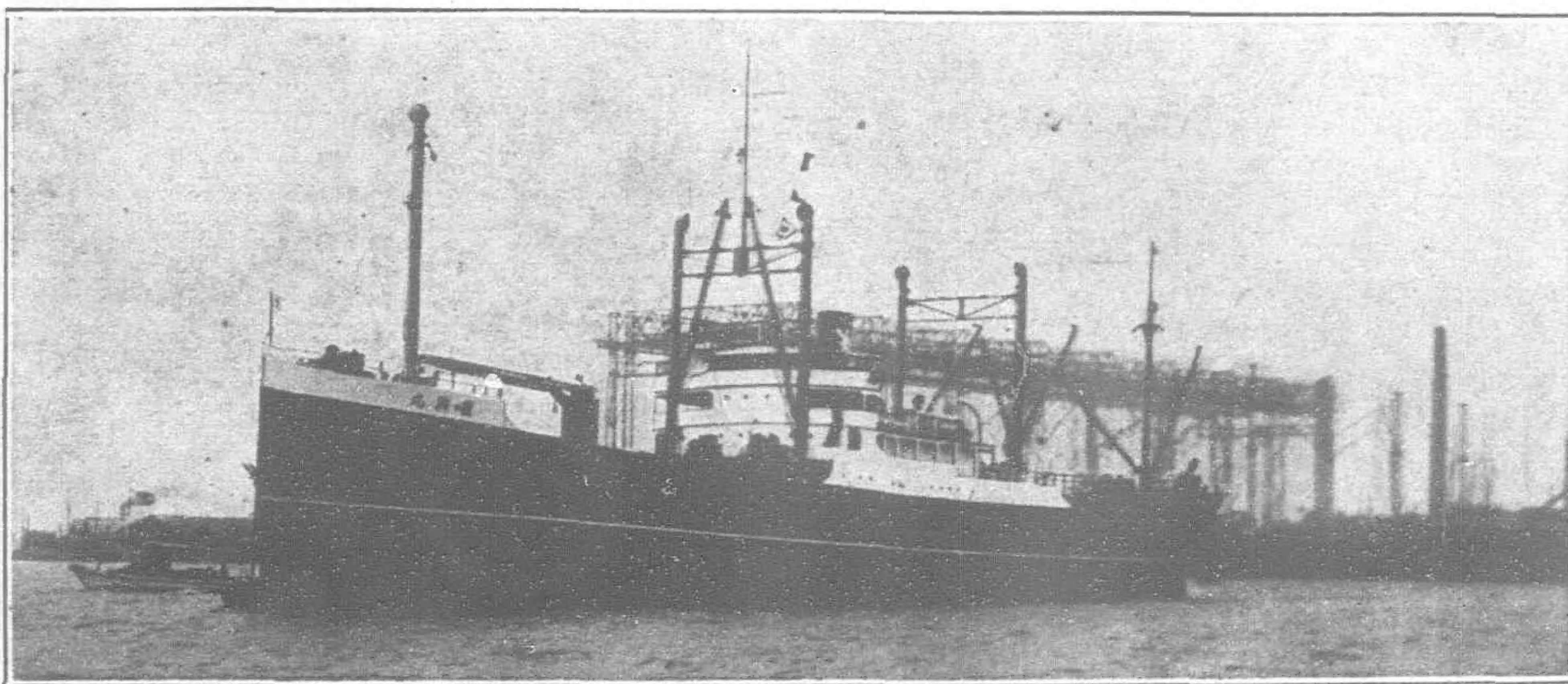
In the *Van Heutz*, under construction at the De Schelde yard at Flushing, which is exactly similar so far as accommodation and dimensions are concerned, Sulzer machinery is to be used. There will be two engines, each developing, as in the case of the other vessel, 2,330 i.h.p., and these are of the normal two-cycle single-acting Sulzer design. They have six cylinders, 600 mm. bore and 1,060 mm. stroke, whereas the dimensions of the Werkspoor engines are 740 mm. and 1,300 mm., respectively. In each case the speed of revolution is about 100 r.p.m.

Efficient equipment in the form of electrically operated auxiliaries throughout will be provided. In each ship there will

be two 400 b.h.p. Diesel engines coupled to dynamos, four-cycle engines in the one case and two-cycle in the other, and these will supply electricity for the engine room pumps, the deck machinery, steering gear and all other plant on the ship.

A firm of Japanese Shipowners, the Itaya Steam Ship Co., Hokkaido, has ordered a twin-screw cargo boat from a Sulzer licensee in Japan, the Kobe Steel Works, Kobe. This ship, of about 10,000 tons dead weight, will be propelled by two Diesel engines, type 4ST60, developing together 3,000 b.h.p. at 110 r.p.m. The engines will be built by the Kobe Steel Works.

The Japanese twin-screw motorship *Fukko Maru*, was built by Suzuki & Co. at their Kobe shipyard. The vessel, which was completed in December, has been chartered for lumber from the North Pacific. The *Fukko Maru* is the first motorship under the Japanese flag built primarily for the carriage of lumber, if not the world's first new Diesel craft with this distinction. The experiment involves the question of building



The *Fukko Maru*

high-priced but economically operated tonnage for low-grade and low-rate cargoes. Radical departures from the ordinary in the *Fukko Maru's* construction caused a dispute over her classification in Lloyds, but she was finally rated as 100-A-1. The *Fukko Maru* has her house amidships, but the space on the main deck is otherwise almost unbroken, the masts being employed as ventilators and the winches being situated on the superstructure. There is a mooring post for deck-loads between the No. 1 and No. 2 holds, and beneath this is the only bulkhead dividing the holds. Nos. 3 and 4 hold are divided only by a centre pillar, and there is a centre pillar in No. 2 hold. There are no stanchions in the cargo space. Thus great facility is provided for stowing lumber, both below and above decks. The *Fukko Maru* will carry 3,500,000-ft. of lumber. She is of 6,000 tons deadweight, 3,600 tons gross, or 2,200 net; length, B. P., 350-ft.; moulded breadth, 50-ft.; moulded depth to upper deck, 27-ft., and loaded draught, about 22-ft. The motorship is powerful with twin Sulzer Diesel two-cycle, four-cylinder engines of 800 b.h.p. each. She consumes 7.5 tons of oil per day at her sea speed of 10 knots. Her total fuel oil capacity is 1,500 tons, giving her a tremendous navigating radius.

Road Construction Conference in Hunan

Delegates representing 24 districts of Southern Hunan were invited by the Hunan Authorities to a conference held in Changsha on September 15 to discuss the various issues in connection with the plan of building a network of modern highways in southern Hunan. The program passed at the conference maps out six roads comprising a total length of 1,200 li to be constructed for southern Hunan. A sum of \$3,000,000 has been voted for the expenses, the average cost of building a li of road being estimated at \$2,500. The program is to be carried out in five years. Each year about 240 li of the projected roads are to be built and \$600,000 will be raised by levying surtaxes on various provincial duties. A bank is to be organized to handle the funds in connection with the road building scheme.

Chinese Market for Low-Grade Iron and Steel

EVEN in the most active periods, the trade in low-grade and scrap iron and steel with China is largely a business in small tonnages except in the case of old plates, cuttings of plates and similar materials, orders for which will run from a few hundred tons to several thousand. Profits made on the smaller lots are usually meagre. While the demand for wire shorts is perhaps the best sustained of any, buying by Chinese merchants includes such other scrap or defective materials as bar crop-ends, plate cuttings, second-hand plates, used chain, old wrought-iron horse-shoes, old files, hoop-ends, defective wire rods, old enamelled signs, old wagon tyres, tinplate wasters, tinplate waste waste and tinplate scrap. In new materials bamboo steel is the one product peculiar to the Chinese trade, with galvanised sheets and black sheets by the crate occasionally in active demand.

Bamboo Steel

Bamboo steel, a large part of China's requirements of which had been supplied by American makers during the war, was previously supplied under popular brand names principally by German mills, which have returned to the Chinese market as the principal suppliers of this material. While the requisite quality of all the second-hand and defective material purchased is softness, so that it may be the more easily forged by hand, bamboo steel ranges from 0.65 to as high as 0.85 per cent. carbon, and is forged and tempered for use in cutting tools of various kinds.

In testing bamboo steel the practical method is to a great extent substituted for the scientific. No specific carbon content is demanded as a rule, the quality required being a clean break of a bar from 34-in. to 36-in. long, dropped from the height of a man's head. The name of this carbon tool steel is taken from the appearance, the manufacturer rolling the bar with joints and lines that give it the resemblance to sections of bamboo. Although the leading American export interest now ships a small tonnage of bamboo steel to China, the sale of this product under brand names does not seem to have developed among American mills to any extent. The return of Germany to world markets has slowly edged the American product from China, as the market price under keen competition has slowly declined.

Galvanised Sheets

In addition to bamboo steel, China is a purchaser of other material, including galvanised wire, wire nails, mild-steel bars, black and galvanised gas pipe, galvanised sheets and some structural material. With the exception of pipe and considerable purchases of sheets, much of the business of to-day goes to Continental works. In purchasing galvanised sheets the most popular specification is 48 sheets to a 4½-cwt. crate, measuring 3 by 7-ft., with Nos. 38, 33 and 25 gauges; 4 by 7-ft., also popular, in crates of 560 lbs. Plain galvanised sheets are principally in demand, although corrugated material is occasionally purchased. When the sheets are finally disposed of in small lots from the warehouse, they are generally sold by the picul (133½-lbs.). There is also a fair market for stove-pipe sheets.

In the Shanghai market quotations are generally published on the two most popular brands of galvanised plain sheets, Raven, rolled by the Grovesend Steel & Tinplate Company, Limited, Gorseinon, Glamorgan, Wales, and the Apollo brand of the American

Sheet & Tin Plate Company. General classifications of English and American sheets are also made. As in Japan galvanised sheets are extensively used for roofing purposes and in the construction of side walls of small buildings, for storehouses and similar purposes.

Nails and Wire Shorts

When a Chinese merchant inquires for nails the exporter correctly assumes that he is interested in purchasing countersunk, chequer-head wire nails of Birmingham wire gauge. The only type of nail consumed in any quantity is the cut nail. Countersunk, chequer-head wire nails are used in sizes of $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$ and 1-in. to 7-in. in the Northern districts of China, supplied by the Shanghai market, and in sizes of $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ and 1-in. in the Southern districts, supplied through Hongkong and Canton. This difference in specifications between Northern and Southern China also appears in the method of ordering quantities, the North buying by the 100-lb. keg, the South demanding the picul keg of 133½-lbs. Since the war the trade in nails, which the American exporter enjoyed during that period and directly afterwards, has to a great extent disappeared with the return to world markets of European steel-producing countries. It is noteworthy, perhaps, that while the earthquake in Japan in 1923 resulted in a rather heavy demand on Chinese stocks of nails, which were the nearest available supplies for the devastated districts in Japan, practically none of the replacement business was received by American works. This turn to European sources of supply since the war is particularly true of structural material purchases, the larger part of which are placed with European works particularly Belgian, at prices lately many dollars a ton below the American delivered price.

Of the so-called second-hand or defective materials purchased, wire shorts, galvanised and plain, are probably in more continuous demand than most of the other products used. A wire short generally consists of a coil of wire, ranging up to 40 or 50-ft., or short of a standard length. Occasionally, a full standard coil will be included where the wire has been found defective. Lots are assorted, various gauges being included in a single lot, as a rule. The most usual assortments of shorts range from Nos. 6 to 16 gauge. Annealed wire shorts are in demand in gauges from Nos. 16 to 25. In wire shorts, unlike most other materials, the bulk of the trade is with the United States, where the mills make more serious efforts to meet the conditions. The larger part of the American exports is in galvanised rather than plain shorts, the United Kingdom making a very showing in exports of plain-wire shorts, particularly in the past few years. Shorts are used by the Chinese for a wide range of purposes where American manufacturers, working with modern machinery, regard full coils of perfect wire essential for high rates of production.

Tinplate Waste Waste

Possibly next to the wire shorts as a material in active demand by the Chinese consumer is tinplate waste waste, which has advanced to a position of relative importance in Far Eastern trade in the past year or two. Tinplate waste waste, of lower grading than tinplate wasters, but considerably better than tinplate scrap, consists of assorted gauges and sizes of plate ranging from 10 by 14-in. to 18 by 28-in. and base weights of 70-lbs. to 155-lbs. and heavier, packed as a rule in 200-lb. cases. One of the larger American tinplate mills estimates that it has available under normal

conditions about 200 tons of such material per quarter, and estimates of the annual available tonnage from all tinplate mills in the United States vary from 7,000 to 8,000 tons or more annually.

Tools and Utensils

The majority of the tools, household utensils and agricultural implements used in China, particularly in the interior, where life is more primitive than in the large cities, are hand-forged from scrap, providing a demand by importers in Shanghai and other ports, who distribute to the local blacksmith or householder. In these small lots of all kinds of scrap and defective iron and steel, the prime requisite is sufficient softness to permit working by hand. Second-hand plates, plate cuttings, bar crop ends, hoop ends, and round, square and semi-hard cobbles are popular. From such raw materials the Chinese workman fashions spikes, knives, often with an edge of bamboo steel, digging forks, hoes and numerous other tools and utensils. About the only requirement of a piece of scrap, obviously, is softness and sufficient area free from bores or damaging imperfections to permit its being formed into a tool at a low price.

Exporters deal with an import company operated and largely owned by British, American, German or some nationals other than Chinese. The business, says Mr. George S. Herrick, in an interesting article in "The Iron Age," is handled through foreign and native banks. The foreign banker finances imports up to the time the material leaves for the interior buyer, while the Chinese banker finances deliveries from the time they leave the public wharf until payment has been received from the buyer at such distributing points as Nanking, Hankow, Kiukiang, Changsha, Ichang and Chungking. There are theoretically four days of settlement in a year, the last day of settlement coming on New Year's day, when all accounts must be closed. In practice the jobber in the interior seldom is clear of indebtedness, carrying forward a balance from year to year.

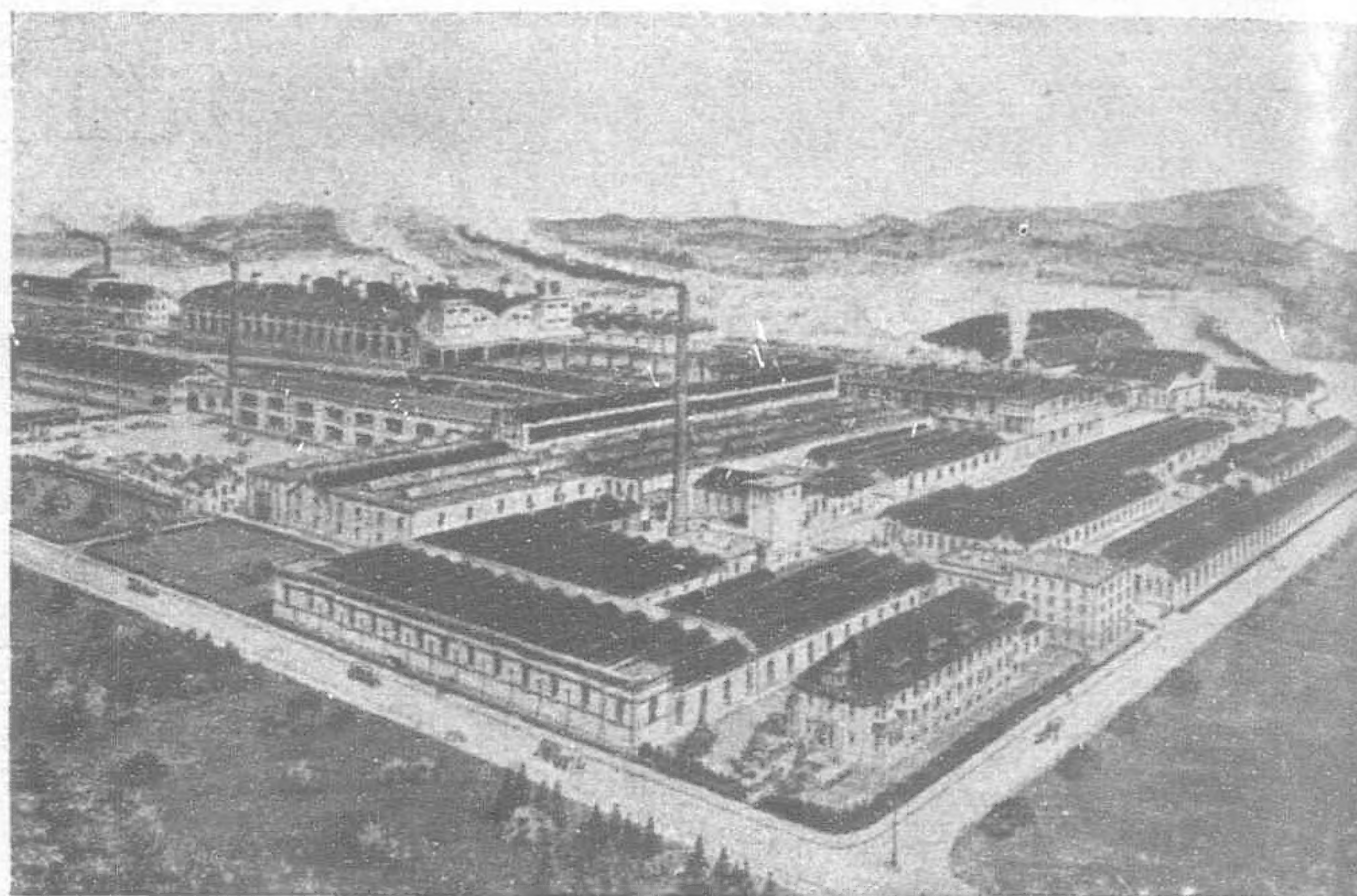
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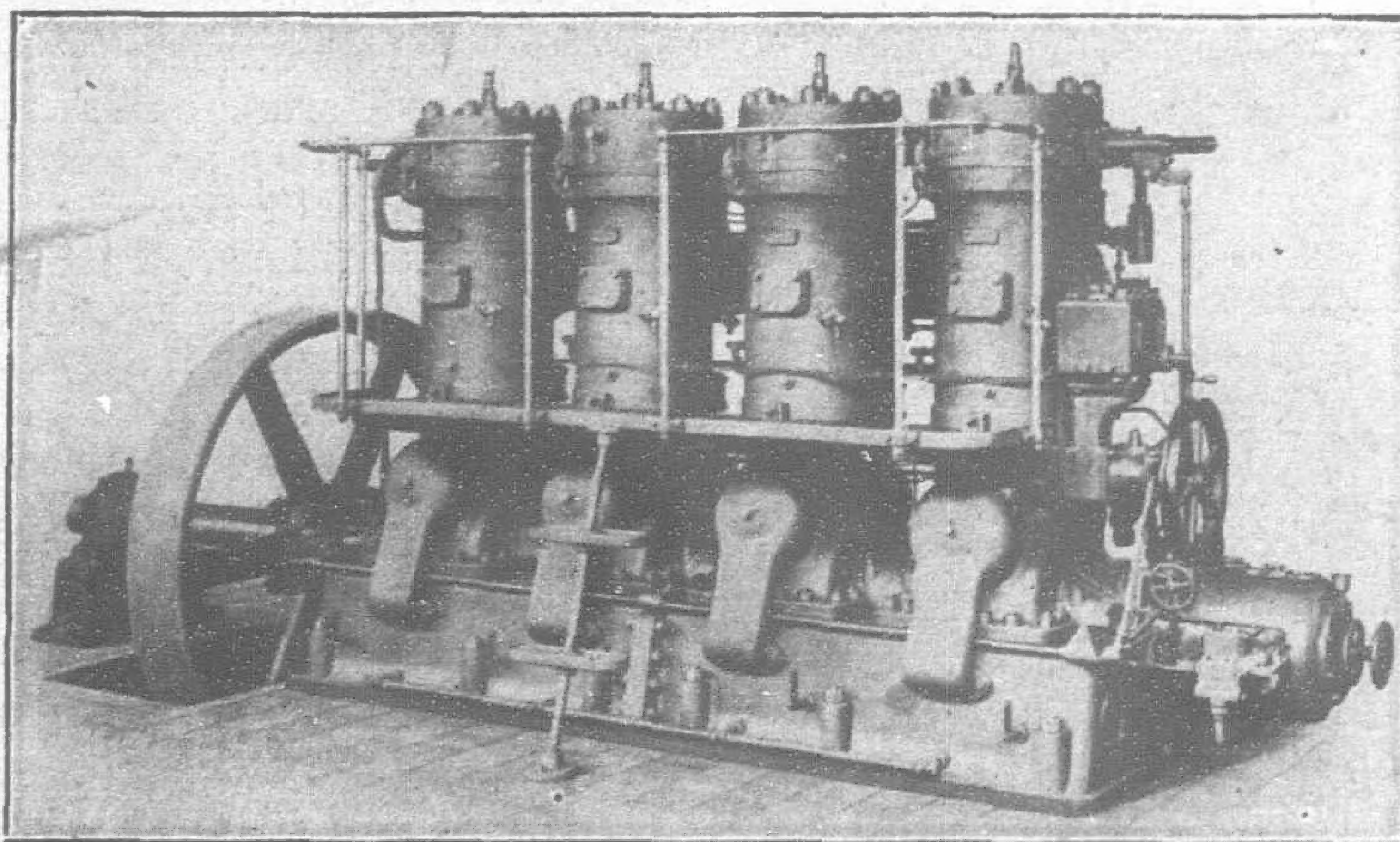
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